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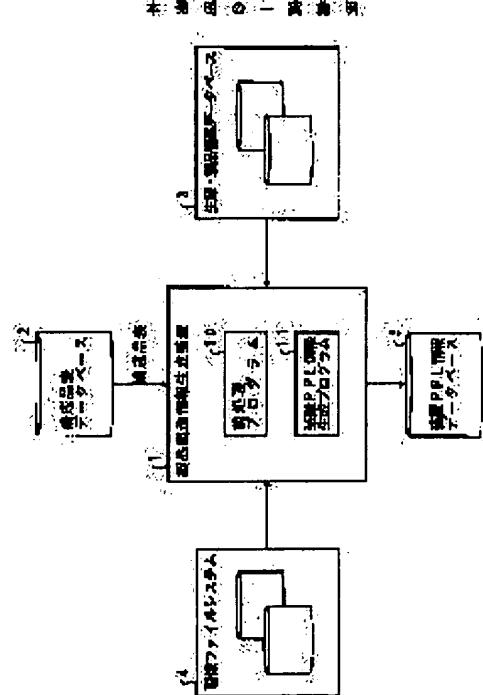
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## (54) PRODUCT MANUFACTURE INFORMATION GENERATING DEVICE AND PROGRAM RECODING MEDIUM

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a product manufacture information generating device for easily generating product manufacture information necessary for manufacturing a product in the early stage of product design.

**SOLUTION:** A constituting article chart prepared in the early stage of product design is obtained, and the obtained constituting article chart is integrated into a tree structure according to the array positions of the constituting articles and the hierarchical levels of the constituting articles, and displayed on a display screen. The tree structure is edited into a form, matched with the product manufacture according to interactive processing, and process information being the procedure of the product manufacture is added to the tree structure, so that the product manufacture information necessary for manufacturing a product can be generated. Thus, it is possible to easily generate the product manufacture information in the early stage of the product design.



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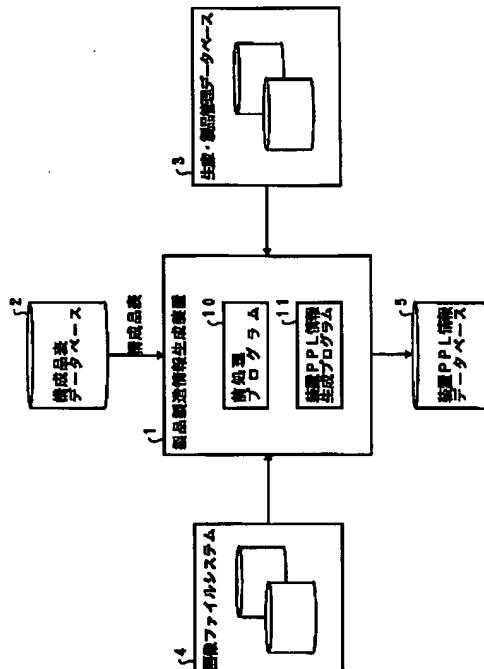
## (54)【発明の名称】 製品製造情報生成装置及びプログラム記録媒体

## (57)【要約】

【課題】本発明は、製品設計の早い段階に、製品の製造に必要となる製品製造情報を簡単に生成できるようにする製品製造情報生成装置の提供を目的とする。

【解決手段】製品設計の早い段階に作成される構成品表を入手して、構成品の配列位置と構成品の階層レベルとに応じて、その入手した構成品表をツリー構造化してディスプレイ画面に表示し、対話処理に従って、そのツリー構造を製品製造に適合させる形に編集していくとともに、そのツリー構造に製品製造の手順となる工程情報を付加することで、製品の製造に必要となる製品製造情報を生成するという構成を探る。これにより、製品設計の早い段階に、簡単に製品製造情報を生成できるようになる。

## 本発明の一実施例



【特許請求の範囲】

【請求項 1】 製品の製造に必要となる製品製造情報を生成する製品製造情報生成装置であって、構成品のリストとして定義される製品の構成品表を入手する入手手段と、

上記入手手段の入手する構成品表を、構成品の配列位置と構成品の階層レベルとに応じてツリー構造化して表示し、対話処理に従い、必要に応じて構成品の配列位置及び／又は階層レベルを変更するとともに、必要に応じて構成品を追加削除しつつ、製品の製造に必要となる工程情報を付加することで製品製造情報を生成する生成手段と、

上記生成手段の生成する製品製造情報を出力する出力手段とを備えることを、特徴とする製品製造情報生成装置。

【請求項 2】 請求項 1 記載の製品製造情報生成装置において、

生成手段は、構成品の属性情報の入力エントリーを表示して、その入力エントリーに対する入力値を受け取ることで、製品製造情報に組み込む構成品の属性情報を取得することを、

特徴とする製品製造情報生成装置。

【請求項 3】 請求項 1 記載の製品製造情報生成装置において、

生成手段は、データ記憶手段にアクセスすることで、製品製造情報に組み込む構成品の属性情報を取得することを、

特徴とする製品製造情報生成装置。

【請求項 4】 請求項 1～3 のいずれかに記載される製品製造情報生成装置において、

生成手段は、指定される構成品及び／又は工程情報に対して、指定される画像情報を割り付けることで製品製造情報を生成することを、

特徴とする製品製造情報生成装置。

【請求項 5】 請求項 1～4 のいずれかに記載される製品製造情報生成装置において、

指定される比較対象の製品製造情報を入力する入力手段と、

表示中の製品製造情報と、上記入力手段の入力する製品製造情報を比較し、その違いを抽出して出力する抽出手段とを備えることを、

特徴とする製品製造情報生成装置。

【請求項 6】 製品の製造に必要となる製品製造情報を生成する製品製造情報生成装置の実現に用いられるプログラムが記録されるプログラム記録媒体であって、

構成品のリストとして定義される製品の構成品表を入手する入手処理と、

上記入手処理で入手する構成品表を、構成品の配列位置と構成品の階層レベルとに応じてツリー構造化して表示し、対話処理に従い、必要に応じて構成品の配列位置及

び／又は階層レベルを変更するとともに、必要に応じて構成品を追加削除しつつ、製品の製造に必要となる工程情報を付加することで製品製造情報を生成する生成処理と、

上記生成処理で生成する製品製造情報を出力する出力処理とをコンピュータに実行させるプログラムが記録されることを、

特徴とするプログラム記録媒体。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、製品設計の早い段階に、製品の製造に必要となる製品製造情報を簡単に生成できるようにする製品製造情報生成装置と、その装置の実現に用いられるプログラムが記録されるプログラム記録媒体とに関する。

【0002】 製品が設計されると、生産技術者は、その設計情報を基にして、組立手順などからなる製品製造情報を作成することで、その製品の量産準備に入り、それから、その製品の量産を開始していく。

【0003】 量産開始までの期間を短縮していくためには、この製品製造情報を設計の早い段階で作成できるようにしていく必要があるとともに、この製品製造情報を簡単に作成できるようにしていく必要がある。

【0004】

【従来の技術】 これまでには、生産技術者の手作業により、製品製造情報を作成していくように処理していた。

【0005】 しかしながら、生産技術者の手作業により製品製造情報を作成するようにしていると、生産技術者に多大な負荷を強いるとともに、その作成に膨大な時間を要するという問題点がある。

【0006】 このようなことを背景にして、最近、CADシステムにより製品の設計情報が作成されると、その3次元モデルデータを入力することで、ビジュアルな製品を表示する構成を探って、その製品表示を介して生産技術者と対話することで、組立手順などを決めていくことにより製品製造情報を作成していくというシステムが開発されてきている。

【0007】

【発明が解決しようとする課題】 確かに、このシステムを用いると、製品製造情報を簡単に作成できるようになる。

【0008】 しかしながら、このシステムでは、CADシステムで設計された3次元モデルデータを入力し、それを用いて生産技術者と対話することで製品製造情報を作成していくという構成を探っていることから、製品製造情報を製品設計の早い段階に作成できないという問題点がある。

【0009】 すなわち、CADシステムによる設計が完了した後でないと、製品製造情報の作成に入れないとから、製品製造情報を設計の早い段階に作成できないと

いう問題点がある。

【0010】これから、このシステムを用いても、量産開始までの期間を短縮できないという問題点が残る。

【0011】本発明はかかる事情に鑑みてなされたものであって、製品設計の早い段階に、製品の製造に必要となる製品製造情報を簡単に生成できるようにする新たな製品製造情報生成装置の提供と、その装置の実現に用いられるプログラムが記録される新たなプログラム記録媒体の提供とを目的とする。

【0012】

【課題を解決するための手段】この目的を達成するためには、本発明の製品製造情報生成装置では、構成品のリストとして定義される製品の構成品表を入手する入手手段と、入手手段の入手する構成品表を、構成品の配列位置と構成品の階層レベルとに応じてツリー構造化して表示し、対話処理に従い、必要に応じて構成品の配列位置及び／又は階層レベルを変更するとともに、必要に応じて構成品を追加削除しつつ、製品の製造に必要となる工程情報を付加することで製品製造情報を生成する生成手段と、生成手段の生成する製品製造情報を出力する出力手段とを備える構成を探る。

【0013】更に、指定される比較対象の製品製造情報を入力する入力手段と、表示中の製品製造情報と、入力手段の入力する製品製造情報を比較し、その違いを抽出して出力する抽出手段とを備えることがある。

【0014】このように構成される本発明の製品製造情報生成装置では、入手手段が構成品のリストとして定義される製品の構成品表を入手すると、生成手段は、入手された構成品表を、構成品の配列位置と構成品の階層レベルとに応じてツリー構造化してディスプレイ画面に表示し、対話処理に従い、必要に応じて構成品の配列位置及び／又は階層レベルを変更するとともに、必要に応じて構成品を追加削除しつつ、製品の製造に必要となる工程情報を付加することで製品製造情報を生成し、これを受けて、出力手段は、生成された製品製造情報を出力する。

【0015】このとき、生成手段は、ディスプレイ画面に構成品の属性情報の入力エントリーを表示して、その入力エントリーに対する入力値を受け取ることで、製品製造情報に組み込む構成品の属性情報を取得したり、データ記憶手段にアクセスすることで、製品製造情報に組み込む構成品の属性情報を取得することができる。また、指定される構成品及び／又は工程情報に対して、指定される画像情報を割り付けることで製品製造情報を生成することができる。

【0016】このように、本発明の製品製造情報生成装置では、製品設計の早い段階に作成される構成品表を入手して、構成品の配列位置と構成品の階層レベルとに応じて、その入手した構成品表をツリー構造化してディスプレイ画面に表示し、対話処理に従って、そのツリー構

造を製品製造に適する形に編集していくとともに、そのツリー構造に製品製造の手順となる工程情報を付加することで、製品の製造に必要となる製品製造情報を生成するという構成を探ることから、製品設計の早い段階に、簡単に製品製造情報を生成できるようになる。

【0017】これから、量産開始までの期間を大幅に短縮できるようになるとともに、製品設計の早い段階に、製品の製造品質を机上で評価でき、それを設計にフィードバックできるようになることで、高い製造品質を持つ製品の設計を実現できるようになる。

【0018】

【発明の実施の形態】以下、実施の形態に従って本発明を詳細に説明する。

【0019】図1に、本発明を具備する製品製造情報生成装置1の一実施例を図示する。

【0020】この図に示すように、本発明の製品製造情報生成装置1は、構成品表データベース2に格納される構成品表を入力として、生産・製品管理データベース3に格納される部品の属性情報などの情報と、画像ファイルシステム4に格納される部品の画像情報（デジタルカメラにより撮影されたものなど）とを参照しつつ、製品の製造に必要となる製品製造情報（以下、装置PPL情報と称する）を生成して装置PPL情報データベース5に格納する処理を行うものであり、この処理を実現するために、前処理プログラム10と装置PPL情報生成プログラム11というプログラムを備える構成を探っている。

【0021】ここで、この前処理プログラム10や装置PPL情報生成プログラム11は、計算機が読み取り可能な半導体メモリなどの適当な記録媒体に格納することができる。

【0022】構成品表データベース2に格納される構成品表は、製品設計の早い段階に、設計者により作成されるものであって、図2に示すように、製品を構成する部品のリストで構成されており、それらの部品の品名／部品番号／数量について記述するものである。

【0023】この構成品表に記述される部品の並びは、設計者が製品の組立順序を考慮した形で決定している。しかしながら、それは設計者の自己判断によるものであって、通常の場合、製造に熟知した生産技術者の判断するものとは大きく異なることが多い。

【0024】一方、構成品表に記述される部品には、大きく分けて、単一の部品で構成される単品部品と、単品部品や他のユニット部品が組み付けられることで構成されるユニット部品がある。部品の部品番号を検索キーにして、生産・製品管理データベース3を検索することで、その部品が単品部品であるのかユニット部品であるのかが分かり、更に、ユニット部品である場合には、それを構成する単品部品やユニット部品が分かる。

【0025】このことから分かるように、構成品表は、

製品を構成する各部品の部品種別についても間接的に記述しているとともに、製品を構成する各部品の階層レベル（ユニット部品に組み付けられる毎に、単品部品の階層レベルは1つ上がる）についても間接的に記述しているのである。

【0026】図3に、前処理プログラム10の実行する処理フローの一実施例、図4ないし図7に、装置PPL情報生成プログラム11の実行する処理フローの一実施例を図示する。

【0027】次に、これらの処理フローに従って、本発明の製品製造情報生成装置1の実行する処理について詳細に説明する。

【0028】前処理プログラム10は、起動されると、図3の処理フローに示すように、先ず最初に、ステップ1で、構成品表データベース2から、処理対象となる製品の構成品表を入力する。

【0029】続いて、ステップ2で、入力した構成品表に記述される各部品の部品番号を検索キーにして生産・製品管理データベース3を検索することで、各部品の属性情報を取得して構成品表の部品に対応付ける。

【0030】例えば、その部品の調達方法や、その部品の作業場所や、その部品の版数や、その部品が補助部品（ネジなど）であるのか否かという情報や、その部品が簡易メイバン（いわゆるシール）であるのか否かという情報などを取得して、構成品表の部品に対応付けるのである。

【0031】ここで、補助部品であるのか否かという情報や、簡易メイバンであるのか否かという情報は、それらの部品については製造現場が調達しなければならないことで重要な意味を持ち、これから、それらの情報を取得するようにしている。

【0032】続いて、ステップ3で、入力した構成品表に記述される各部品の部品番号を検索キーにして生産・製品管理データベース3を検索することで、構成品表に記述されるユニット部品を抽出するとともに、更に生産・製品管理データベース3を参照することで、それらのユニット部品を単品部品に分解する。このとき、ユニット部品が更にユニット部品を持つときには、それを単品部品に分解していくことを繰り返していく。

【0033】そして、この分解処理に応じて、入力した構成品表に記述される単品部品及びユニット部品の階層レベルを特定するとともに、それらのユニット部品を構成する単品部品（ユニット部品がある場合にはそれも含む）の階層レベルを特定する。

【0034】すなわち、構成品表に記述される最初に組立対象となる部品の階層レベルを“1”、構成品表に記述される完成品の階層レベルを“1”、その完成品に直接組み付けられることになる構成品表に記述される部品の階層レベルを“2”と定義するとともに、ユニット部品を単品部品（ユニット部品がある場合にはそれも含

む）に分解すると、分解された部品の階層レベルを分解元のユニット部品の階層レベルより1つ下げる形で決定するという定義方法を用いている場合には、この定義方法に従って、分解処理により求められた単品部品及びユニット部品の階層レベルを特定するのである。

【0035】更に、このステップ3では、生産・製品管理データベース3を参照することで、分解処理により求められた単品部品及びユニット部品の属性情報を取得する処理も行う。

【0036】続いて、ステップ4で、属性情報とユニット部品か否かの情報と階層レベルとを付加した構成品表を、装置PPL情報生成プログラム11に渡して、処理を終了する。

【0037】このようにして、前処理プログラム10は、構成品表データベース2から処理対象となる製品の構成品表を入力して、それに属性情報とユニット部品か否かの情報と階層レベルとを付加していくように処理するのである。

【0038】なお、構成品表に記述されるユニット部品の構成について記述する構成品表が別に用意されるというように、構成品表が階層構造で構成されている場合には、前処理プログラム10は、生産・製品管理データベース3を検索することなく、この階層構造の構成品表を参照することで構成品の階層レベルを特定することが可能になる。

【0039】装置PPL情報生成プログラム11は、この前処理プログラム10の処理を受けて、図4ないし図7の処理フローに示すように、先ず最初に、ステップ1で、その前処理された構成品表を受け取る。

【0040】続いて、ステップ2で、各部品位置に空の工程（例えば、空の組立工程）を割り付けつつ、前処理された構成品表に記述される部品のリスト位置／階層レベル／部品種別から、プロセス・プロダクト・ツリーを作成してディスプレイ画面に表示する。すなわち、例えば図8に示すような画面構造を持つシステム画面を表示して、その左側部分に作成したプロセス・プロダクト・ツリーを表示するのである。

【0041】ここで、このプロセス・プロダクト・ツリー中、「▽」は単品部品、「▼」はユニット部品、「○」は組立工程、「1～6」は階層レベルを表している。ここでは、説明の便宜上、階層レベルが下がる程、階層レベル値が大きくなることを想定している。

【0042】続いて、ステップ3で、前処理された構成品表に記述されている部品名及び部品番号と、それに対応付けられている部品の属性情報を、プロセス・プロダクト・ツリーに記述される部品と対応をとりつつディスプレイ画面に表示する。すなわち、図8に示すように、プロセス・プロダクト・ツリーと対応をとりつつ、システム画面上に、構成品表に記述されている部品の部品名／部品番号／属性情報を表示するのである。

【0043】続いて、ステップ4で、システム画面に対するユーザ操作を待つ。すなわち、ユーザは、システム画面の持つ入力エントリー（プロセス・プロダクト・ツリー以外の領域が入力エントリーとなる）に値を入力したり、システム画面の持つボタンを操作することでプロセス・プロダクト・ツリーの編集要求を指示してくるので、それらの入力を待つのである。

【0044】このステップ4でユーザ操作を検出すると、ステップ5に進んで、ユーザが図8中に示す「格納ボタン」を操作したのか否かを判断して、ユーザが「格納ボタン」を操作したことを判断するときには、ステップ6に進んで、これから説明する処理に従って作成した装置PPL情報を、装置PPL情報データベース5に格納して、処理を終了する。

【0045】一方、ステップ5で、ユーザが「格納ボタン」を操作したのではないことを判断するときには、ステップ7に進んで、ユーザが入力エントリーへの入力要求を発行したのか否かを判断して、ユーザがその入力要求を発行したことを判断するときには、ステップ8に進んで、指定される値を指定される入力エントリーに入力する処理を実行してから、次のユーザ操作を処理すべくステップ4に戻る。

【0046】すなわち、生産・製品管理データベース3から読み込んだ属性情報を変更したり、生産・製品管理データベース3から読み込んだ属性情報には登録されていなかった属性項目に対して、値を入力したり、後述する処理により追加した部品に対して部品名や部品番号を入力したり、初期設定した組立工程の工程名を変更したりするなどの処理を行うのである。

【0047】一方、ステップ7で、ユーザが入力エントリーへの入力要求を発行したのではないことを判断するときには、ステップ9（図5の処理フロー）に進んで、ユーザが図8中に示す「削除ボタン」や「ユニットのみ削除ボタン」を操作したのか否かを判断して、ユーザが「削除ボタン」や「ユニットのみ削除ボタン」を操作したことを判断するときには、ステップ10に進んで、指定される部品や工程を削除することでプロセス・プロダクト・ツリーを編集してから、次のユーザ操作を処理すべくステップ4に戻る。

【0048】すなわち、①プロセス・プロダクト・ツリーの持つ単品部品が選択され、それに続けて「削除ボタン」が操作されるときには、その選択された単品部品を削除し、②プロセス・プロダクト・ツリーの持つユニット部品が選択され、それに続けて「削除ボタン」が操作されるときには、その選択されたユニット部品全体を削除し、③プロセス・プロダクト・ツリーの持つユニット部品が選択され、それに続けて「ユニットのみ削除ボタン」が操作されるときには、その選択されたユニット部品を構成する部品については残し（階層レベルは1つ上げる）つつ、その選択されたユニット部品のみを削除

し、④プロセス・プロダクト・ツリーの持つ工程が選択され、それに続けて「削除ボタン」が操作されるときには、その選択された工程を削除するのである。

【0049】なお、部品や工程の選択については、プロセス・プロダクト・ツリー上の表示マークを選択するのではなくて、それに対応付けられる行を選択することにより選択することも可能である。

【0050】一方、ステップ9で、ユーザが「削除ボタン」や「ユニットのみ削除ボタン」を操作したのではないことを判断するときには、ステップ11に進んで、ユーザが部品の追加を指示するボタン（図8中に示す「▽」や「▼」や「∨」や「▽」）を操作したのか否かを判断して、ユーザがこの部品追加ボタンを操作したことを判断するときには、ステップ12に進んで、指定される追加位置（野線上位置やユニット部品）に、指定される部品を追加（階層レベルは1つ下）することでプロセス・プロダクト・ツリーを編集してから、次のユーザ操作を処理すべくステップ4に戻る。

【0051】このとき、入力エントリーの「品名欄」には、追加部品の部品種別に応じて、「単品部品」とか、「ユニット部品」といった一般名称を自動入力するように処理している。

【0052】ここで、「▽」は単品部品の追加を指示するボタン、「▼」はユニット部品の追加を指示するボタン、「∨」は構成品表には記載されていない自己調達部品の追加を指示するボタン、「▽」は倉入れ対象となるユニット部品の追加を指示するボタンである。

【0053】一方、ステップ11で、ユーザが部品追加ボタンを操作したのではないことを判断するときには、ステップ13に進んで、ユーザが工程の追加を指示するボタン（図8中に示す「○」や「●」や「◇」や「◎」）を操作したのか否かを判断して、ユーザがこの工程追加ボタンを操作したことを判断するときには、ステップ14に進んで、指定される追加位置（野線上位置）に、指定される工程を追加することでプロセス・プロダクト・ツリーを編集してから、次のユーザ操作を処理すべくステップ4に戻る。

【0054】このとき、入力エントリーの「工程名欄」には、追加工程の工程種別に応じて、「組立」とか、「段取り」とか、「試験／検査」とか、「その他」といった一般名称を自動入力するように処理している。

【0055】ここで、「○」は組立工程の追加を指示するボタン、「●」は段取り工程の追加を指示するボタン、「◇」試験／検査工程の追加を指示するボタン、「◎」はその他の工程の追加を指示するボタンである。

【0056】一方、ステップ13で、ユーザが工程追加ボタンを操作したのではないことを判断するときには、ステップ15に進んで、ユーザが図8に示す「移動ボタン」を操作したのか否かを判断して、ユーザが「移動ボタン」を操作したことを判断するときには、ステップ1

6に進んで、指定される位置（部品の移動先は野線位置とユニット部品、工程の移動先は野線上位置）に、指定される部品や工程を移動することでプロセス・プロダクト・ツリーを編集してから、次のユーザ操作を処理すべくステップ4に戻る。

【0057】すなわち、①プロセス・プロダクト・ツリーの持つ単品部品が選択され、それに続けて移動先を指定して「移動先ボタン」が操作されるときには、その選択された単品部品をその移動先に移動し、②プロセス・プロダクト・ツリーの持つユニット部品が選択され、それに続けて移動先を指定して「移動先ボタン」が操作されるときには、その選択されたユニット部品及びそのユニット部品が持つ部品をその移動先に移動し、③プロセス・プロダクト・ツリーの持つ工程が選択され、それに続けて移動先を指定して「移動先ボタン」が操作されるときには、その選択された工程をその移動先に移動するのである。

【0058】ここで、この移動にあたって、移動対象となる部品や工程の名称／番号／属性情報についても、それに合わせて自動的に移動するように処理している。

【0059】一方、ステップ15で、ユーザが「移動ボタン」を操作したのではないことを判断するときには、ステップ17に進んで、ユーザが部品の表現形式の変更を指示するボタン（図8中に示す「集合表現ボタン」や「個別表現ボタン」や「ユニット切替ボタン」）を操作したのか否かを判断して、ユーザがこの表現形式変更ボタンを操作したことを判断するときには、ステップ18（図6の処理フロー）に進んで、指定される部品に対して指定される表現形式の変更処理を実行することでプロセス・プロダクト・ツリーを編集してから、次のユーザ操作を処理すべくステップ4に戻る。

【0060】すなわち、プロセス・プロダクト・ツリーの持つ部品が選択され、それに続けて「集合表現ボタン」が操作されるときには、その選択された部品に対応付けられる行と同一データを持つ上下に連続する行を1つの行としてまとめるとともに、入力エントリーの「数欄」に1つにまとめた行数を登録することで、プロセス・プロダクト・ツリーの表現形式を変更（連続配置される同一部品を1つにまとめる）るのである。

【0061】そして、プロセス・プロダクト・ツリーの持つ部品が選択され、それに続けて「個別表現ボタン」が操作されるときには、その選択された部品に対応付けられる行を入力エントリーの「数欄」に登録される数分の行に分解するとともに、入力エントリーの「数欄」にそれぞれ“1”を登録することで、プロセス・プロダクト・ツリーの表現形式を変更（1つにまとめられた部品を個々に分解する）のである。

【0062】そして、プロセス・プロダクト・ツリーの持つユニット部品が選択され、それに続けて「ユニット切替ボタン」が操作されるときには、その選択されたユ

ニット部品に含まれる部品及び工程を特定して画面上から消去するとともに、その選択されたユニット部品の表示色を規定のものに変更することで、プロセス・プロダクト・ツリーの表現形式を変更するのである。

【0063】そして、その表示色の変更されたユニット部品が選択され、それに続けて「ユニット切替ボタン」が操作されるときには、その選択されたユニット部品に含まれる部品及び工程を特定して画面上に再表示するとともに、その選択されたユニット部品の表示色を元のものに変更することで、プロセス・プロダクト・ツリーの表現形式を変更するのである。

【0064】一方、ステップ17（図5の処理フロー）で、ユーザが表現形式変更ボタンを操作したのではないことを判断するときには、ステップ19（図6の処理フロー）に進んで、ユーザが図8中に示す「画像貼付ボタン」や「自動貼付ボタン」を操作したのか否かを判断して、ユーザが「画像貼付ボタン」や「自動貼付ボタン」を操作したことを判断するときには、ステップ20に進んで、指定される部品や工程に指定される画像を貼付してから、次のユーザ操作を処理すべくステップ4に戻る。

【0065】すなわち、プロセス・プロダクト・ツリーの持つ部品が選択され、それに続けて「画像貼付ボタン」が操作されるときには、指定される画像ファイルに格納される画像の一覧を表示する構成を探って、その中から選択される画像（例えば選択された部品の画像）をその選択された部品に貼付するとともに、入力エントリーの「P I C欄」に貼付した画像の数を登録することで、ユーザの選択した部品に画像を貼付するのである。

【0066】そして、プロセス・プロダクト・ツリーの持つ工程が選択され、それに続けて「画像貼付ボタン」が操作されるときには、指定される画像ファイルに格納される画像の一覧を表示する構成を探って、その中から選択される画像（例えば選択された工程における部品の組み立て手順を示す画像）をその選択された工程に貼付するとともに、入力エントリーの「P I C欄」に貼付した画像の数を登録することで、ユーザの選択した工程に画像を貼付するのである。

【0067】そして、プロセス・プロダクト・ツリーの持つ部品が選択され、それに続けて「自動貼付ボタン」が操作されるときには、指定される画像ファイルに格納される画像を貼付対象として、その選択された部品の部品番号が指す画像を特定する構成を探って、その特定した画像をその選択された部品に貼付するとともに、入力エントリーの「P I C欄」に貼付した画像の数を登録することで、ユーザの選択した部品に画像を自動貼付するのである。

【0068】そして、プロセス・プロダクト・ツリーの持つ工程が選択され、それに続けて「自動貼付ボタン」が操作されるときには、指定される画像ファイルに格納

される画像を貼付対象とし、その選択された工程の工程番号（この処理を行うときには、予め工程番号を登録しておく必要がある）が指す画像を特定する構成を採って、その特定した画像をその選択された工程に貼付するとともに、入力エントリーの「P I C欄」に貼付した画像の数を登録することで、ユーザの選択した工程に画像を自動貼付するのである。

【0069】なお、部品や工程が選択されずに、「自動貼付ボタン」が操作されるときには、全ての部品及び工程が選択されたものとして、この画像の自動貼付処理を実行するように処理している。

【0070】ここで、この貼付した画像については、次に説明する「画像表示ボタン」を使ってディスプレイ画面上に表示しているときに「消去ボタン」が操作されるとき、その登録を消去しているように処理している。

【0071】一方、ステップ19で、ユーザが「画像貼付ボタン」や「自動貼付ボタン」を操作したのではないことを判断するときには、ステップ21に進んで、ユーザが図8中に示す「画像表示ボタン」を操作したのか否かを判断して、ユーザが「画像表示ボタン」を操作したことを判断するときには、ステップ22に進んで、指定される部品や工程に貼付される画像をシステム画面上に表示してから、次のユーザ操作を処理すべくステップ4に戻る。

【0072】すなわち、プロセス・プロダクト・ツリーの持つ部品や工程が選択され、それに続けて「画像表示ボタン」が操作されるときには、その選択された部品や工程に貼付される画像を表示するとともに、複数の画像が貼付される場合には、「NEXTボタン」の操作に応答して、先頭に貼付される画像から順番に貼付される画像をシステム画面上に表示していくのである。

【0073】一方、ステップ21で、ユーザが「画像表示ボタン」を操作したのではないことを判断するときには、ステップ23に進んで、ユーザが図8中に示す「倉入ボタン」を操作したのか否かを判断して、ユーザが「倉入ボタン」を操作したことを判断するときには、ステップ24に進んで、指定されるユニット部品を倉入れ部品に設定してから、次のユーザ操作を処理すべくステップ4に戻る。

【0074】すなわち、プロセス・プロダクト・ツリーの持つユニット部品が選択され、それに続けて「倉入ボタン」が操作されるときには、その選択されたユニット部品に含まれる部品及び工程を特定して画面上から消去するとともに、その選択されたユニット部品の表示マークを「▼」から「▽」に変更することで、ユーザの選択したユニット部品を倉入れ部品に変更するのである。

【0075】一方、ステップ23で、ユーザが「倉入ボタン」を操作したのではないことを判断するときには、ステップ25に進んで、ユーザが図8中に示す「UNDOボタン」を操作したのか否かを判断して、ユーザが

「UNDOボタン」を操作したことを判断するときには、ステップ26に進んで、1編集処理前の状態に戻してから、次のユーザ操作を処理すべくステップ4に戻る。

【0076】すなわち、「UNDOボタン」が操作される前に、部品の追加処理を実行しているときには、「UNDOボタン」が操作されると、その追加処理を行う前の状態に戻すといったように、1編集処理前の状態に戻していくのである。

【0077】このようにして、ステップ4～ステップ26の処理を繰り返していくことで、システム画面に表示するプロセス・プロダクト・ツリーが生産技術者によって編集され、これにより図9に示すような形で完成していくことになる。

【0078】ここで、この図から分かるように、プロセス・プロダクト・ツリーに記述される各部品や各工程に対しては1行が割り当てられ、この1行を使って、各部品や各工程の持つ属性情報を表示するようにしている。

【0079】一方、ステップ25で、ユーザが「UNDOボタン」を操作したのではないことを判断するときには、ステップ27（図7の処理フロー）に進んで、ユーザが図8中に示す「集計ボタン」を操作したのか否かを判断して、ユーザが「集計ボタン」を操作したことを見たときには、ステップ28に進んで、入力エントリーの「試算工数欄」に入力されている試算工数を集計して、その集計値を最終行に表示してから、次のユーザ操作を処理すべくステップ4に戻る。

【0080】すなわち、入力エントリーの「試算工数欄」に入力されている試算工数（例えば、秒を単位として記述されている）を集計することで、処理対象となる製品の完成に要する総工程時間を集計して、それを表示していくように処理するのである。

【0081】この「試算工数欄」に入力される試算工数は、生産技術者が入力していくことでもよいが、生産・製品管理データベース3が工程番号を検索キーにして標準的な試算工数を管理する構成を探っている場合は、それを取得して「試算工数欄」に自動入力していくことでよい。但し、この処理を行うときには、予め工程番号を登録しておく必要がある。

【0082】一方、ステップ27で、ユーザが「集計ボタン」を操作したのではないことを判断するときには、ステップ29に進んで、ユーザが図8中に示す「比較表ボタン」を操作したのか否かを判断して、ユーザが「比較表ボタン」を操作したことを見たときには、ステップ30に進んで、比較対象のプロセス・プロダクト・ツリーと比較レベルとを設定する。

【0083】すなわち、「比較表ボタン」が操作されるときには、これから説明するように、システム画面に表示中のプロセス・プロダクト・ツリーと比較対象のプロセス・プロダクト・ツリーとを比較することでその差異

を抽出して、それをシステム画面上に表示するという処理を行うことから、比較対象のプロセス・プロダクト・ツリーと比較レベルとを設定するのである。

【0084】この比較対象のプロセス・プロダクト・ツリーの設定処理は、例えば、比較対象ファイルに格納されるこれまでに作成したプロセス・プロダクト・ツリーの一覧を表示する構成を探って、その中からプロセス・プロダクト・ツリーを選択させることで行う。

【0085】また、この比較レベルの設定処理は、例えば、①図番（部品番号と対応付けられている）の違う部品を抽出するという比較レベルを設定する、②図番の違いに加えて、同一図番でも親図番が異なる部品については違う部品と見なすという比較レベルを設定する、③図番・親図番の違いに加えて、同一図番・同一親図番でも階層レベルの異なる部品については違う部品と見なすという比較レベルを設定する、という選択肢を持つ選択画面を表示して、その中から選択させることで行う。

【0086】続いて、ステップ31で、装置PPL情報データベース5から比較対象の装置PPL情報を読み込み、その読み込んだ装置PPL情報の持つプロセス・プロダクト・ツリーと、システム画面に表示中のプロセス・プロダクト・ツリーとを比較することでその差異を抽出して、それをシステム画面上に表示してから、次のユーザ操作を処理すべくステップ4に戻る。

【0087】すなわち、例えば図10に示すような形で、その2つのプロセス・プロダクト・ツリーの違いを表示するのである。このとき、ユーザが比較表の行位置を指定して比較表の持つ「ツリー検索ボタン」を操作するときには、その違いの個所となるプロセス・プロダクト・ツリー部分にカーソルを対応付けることで、どこの部分が違うのかを示すとともに、ユーザがシステム画面の持つ「次検索ボタン」を操作するときには、その違いの個所となる次のプロセス・プロダクト・ツリー部分にカーソルを対応付けていくのである。

【0088】なお、比較元となる表示中のプロセス・プロダクト・ツリーの方が少ないことで違うとなる個所を持たないときには、親図番の指す位置にカーソルを対応付けていくように処理している。更に、ユーザが比較表の持つ「比較格納ボタン」を操作するときには、作成した比較表を指定されるファイルに格納するように処理している。

【0089】ここで、図10に示す比較結果では、比較表の1行目で、表示中のプロセス・プロダクト・ツリーの製品では、単品部品（PWR PLATE, 11base）が1個少ないことを示し、比較表の2行目で、表示中のプロセス・プロダクト・ツリーの製品では、単品部品（基本部品, buhin01）が1個多いことを示し、比較表の3行目で、表示中のプロセス・プロダクト・ツリーの製品では、ユニット部品（MB, pa00700-258k-prt）が1個少ないことを示し、比較表の4行目で、表示中のプロセス・プロダク

ト・ツリーの製品（自己調達部品（コネ, ru6sw2n3-061-prt）が2個少ないことを示している。

【0090】この比較機能が用意されていることで、設計変更などがあった場合に、部品や工程の違いを簡単に抽出できるようになる。

【0091】一方、ステップ29で、ユーザが「比較表ボタン」を操作したのではないことを判断するときは、ステップ32に進んで、ユーザ操作の指定する処理を実行してから、次のユーザ操作を処理すべくステップ4に戻る。

【0092】このようにして、装置PPL情報生成プログラム11は、前処理プログラム10から、属性情報と部品種別と階層レベルとが付加された構成品表を受け取ると、その構成品表の指定するプロセス・プロダクト・ツリーを初期ツリーとして表示し、生産技術者と対話することでそれを編集して、生産技術者のノウハウに基づいた形でプロセス・プロダクト・ツリーを完成させるのである。

【0093】このようにして完成されるプロセス・プロダクト・ツリーは、処理対象の製品を製造するのには、どのような部品を用意する必要があるのかということについて記述するとともに、「製品本体のA単品部品にB単品部品を組み付け、その後、それとCユニット部品とを組み付け、その後、それとD単品部品とEユニット部品とを組み付け、・・・」といったように、それらの部品をどのような手順で組み立てていけばよいのかということについて記述している。

【0094】更に、このプロセス・プロダクト・ツリーには、処理対象の製品の製造に必要となる部品や工程の属性情報が対応付けて記述されるとともに、画像が対応付けて登録されている。したがって、完成されたプロセス・プロダクト・ツリーは、処理対象の製品を製造するにあたって必要となる製造情報を全て記述していると言える。

【0095】これから、生産技術者は、このシステム画面に表示される情報（装置PPL情報）に従って、設計の早い段階に、これから設計される製品の製造品質を机上で評価できるようになる。

【0096】図11に、このようにして生成される装置PPL情報を用いて、製品製造情報の提供サービスを実行する製品製造情報提供装置20の一例を図示する。

【0097】この製品製造情報提供装置20は、キッティングリスト作成プログラム21と、作業手順書作成プログラム22と、設計変更通知プログラム23というプログラムを使って製品製造情報の提供サービスを実行する。

【0098】このキッティングリスト作成プログラム21は、装置PPL情報データベース5から装置PPL情報を読み込むと、その装置PPL情報から工程情報を取り除くことで部品情報のみを抽出する。

【0099】そして、端末30を介して生産技術者と対話することで、それらの部品情報の分類方法（例えば、作業場所毎にグループピングするといった分類方法）を設定して、それらの部品情報をその指定される分類方法（例えば作業場所別）に従って分類することで、図12に示すような部品リストを作成する。

【0100】このとき、ユーザに対して、ユニット部品については出力対象から外すとか、ユニット部品のみを出力対象とするとか、全ての部品を出力対象とするとかを選択させ、その選択に従って出力対象とする部品を決定して、出力対象とする部品であるのか否かを明示する形で部品リストを表示する。

【0101】そして、分類が変わるとときに改ページする形式に従いつつ、図13に示すような出力対象とする各部品の画像のリスト（ビジュアルなキッティングリスト）を作成して、それをプリンタ40で印刷したり、WEBサーバに登録することで閲覧できるようになる。

【0102】このようにして作成されるビジュアルなキッティングリスト（部品の画像に対応付けて、その部品の部品名称や図面番号についても記述している）が用意されることで、製品を製造する作業者は、製品を製造するにあたって、どのような部品を用意しなければならないのかを正確かつ簡単に把握できるようになる。

【0103】一方、作業手順書作成プログラム22は、装置PPL情報データベース5から装置PPL情報を読み込むと、端末30のディスプレイ画面に、図14に示すような入力画面を表示する。すなわち、装置PPL情報の持つプロセス・プロダクト・ツリーと、図15に示すような入力エントリーとを持つ入力画面を表示するのである。

【0104】そして、この入力画面を使って生産技術者と対話することで、読み込んだ装置PPL情報の持つプロセス・プロダクト・ツリーに記述される各工程毎に、どのような手順で作業を行い、どのようなことが作業の急所になっていて、その理由はこうであるというようなドキュメント情報を生成する。このとき、工程に貼付された画像を表示して、図16に示すように、そこに矢印や文字などを書き込むことで、作業の手順が分かり易いものとなるようにする。

【0105】そして、このようにして作成した図17に示すようなドキュメント情報を作業手順書として、プリンタ40で印刷したり、WEBサーバに登録することで閲覧できるようになる。

【0106】このようにして作成される作業手順書が用意されることで、製品を製造する作業者は、製品を製造するにあたって、どのような手順に従い、どのようなことに注意しながら作業を進めなければならないのかということを正確かつ簡単に把握できるようになる。

【0107】一方、設計変更通知プログラム23は、定期的に設計変更データベース50にアクセスすること

で、設計変更された品があるのか否かをチェックする。そして、設計変更された品があることを判断するときには、装置PPL情報データベース5にアクセスすることで、その品の装置PPL情報のIDを取得して、そのIDの情報と設計変更データベース50から得られた設計変更情報を、装置PPL情報に対応付けて登録されている担当の生産技術者に電子メールで通知していく。

【0108】この設計変更通知プログラム23が用意されることで、生産技術者は、製品の設計変更が行われたときに、その品の装置PPL情報に迅速にアクセスできるようになることで、設計変更に適切に対処できるようになる。

【0109】

【発明の効果】以上説明したように、本発明では、製品設計の早い段階に作成される構成品表を入手して、構成品の配列位置と構成品の階層レベルとに応じて、その入手した構成品表をツリー構造化してディスプレイ画面に表示し、対話処理に従って、そのツリー構造を製品製造に適合させる形に編集していくとともに、そのツリー構造に製品製造の手順となる工程情報を付加することで、製品の製造に必要となる製品製造情報を生成するという構成を探ることから、製品設計の早い段階に、簡単に製品製造情報を生成できるようになる。

【0110】これから、量産開始までの期間を大幅に短縮できるようになるとともに、製品設計の早い段階に、製品の製造品質を机上で評価でき、それを設計にフィードバックできるようになることで、高い製造品質を持つ製品の設計を実現できるようになる。

【図面の簡単な説明】

【図1】本発明の一実施例である。

【図2】構成品表の説明図である。

【図3】前処理プログラムの実行する処理フローである。

【図4】装置PPL情報生成プログラムの実行する処理フローである。

【図5】装置PPL情報生成プログラムの実行する処理フローである。

【図6】装置PPL情報生成プログラムの実行する処理フローである。

【図7】装置PPL情報生成プログラムの実行する処理フローである。

【図8】ディスプレイ画面の説明図である。

【図9】ディスプレイ画面の説明図である。

【図10】ディスプレイ画面の説明図である。

【図11】本発明を利用するシステムの説明図である。

【図12】ディスプレイ画面の説明図である。

【図13】キッティングリストの説明図である。

【図14】ディスプレイ画面の説明図である。

【図15】ディスプレイ画面の説明図である。

【図16】ディスプレイの説明図である。

【図17】作業手順書の説明図である。

### 【符号の説明】

## 1 製品製造情報生成装置 2 構成品表データベース

### 3 生産・製品データベース

## 4 画像ファイルシステム

## 5 装置PPL情報データベース

## 10 前処理プログラム

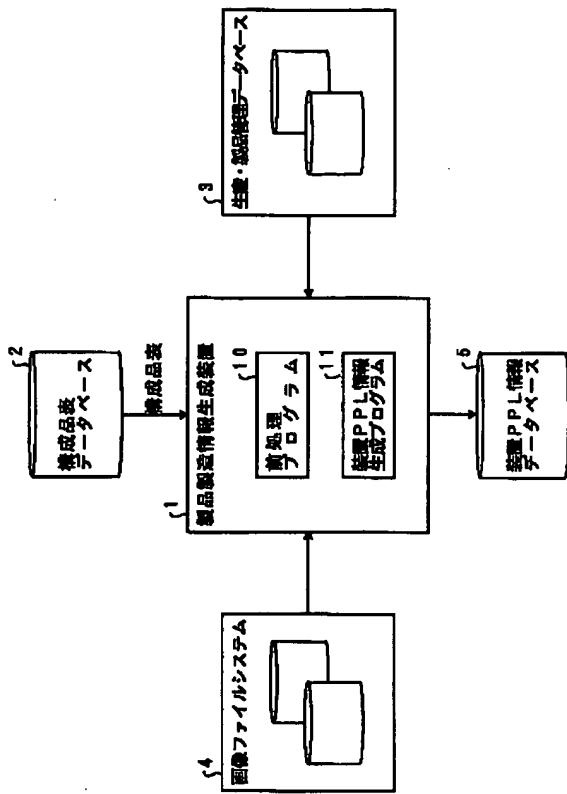
## 1.1 装置PPL情報生成プログラム

【図1】

【図2】

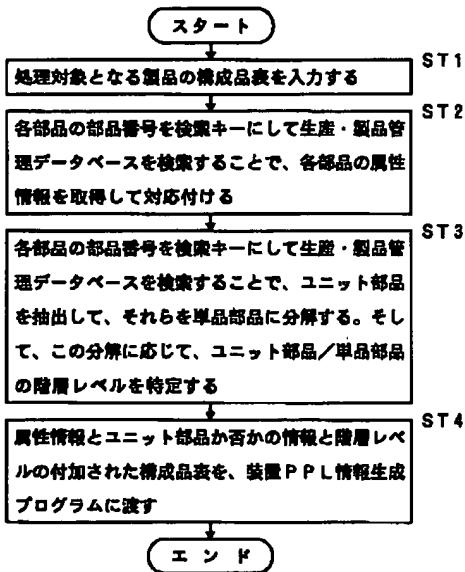
### 本発明の一実施例

### 構成品表の説明図



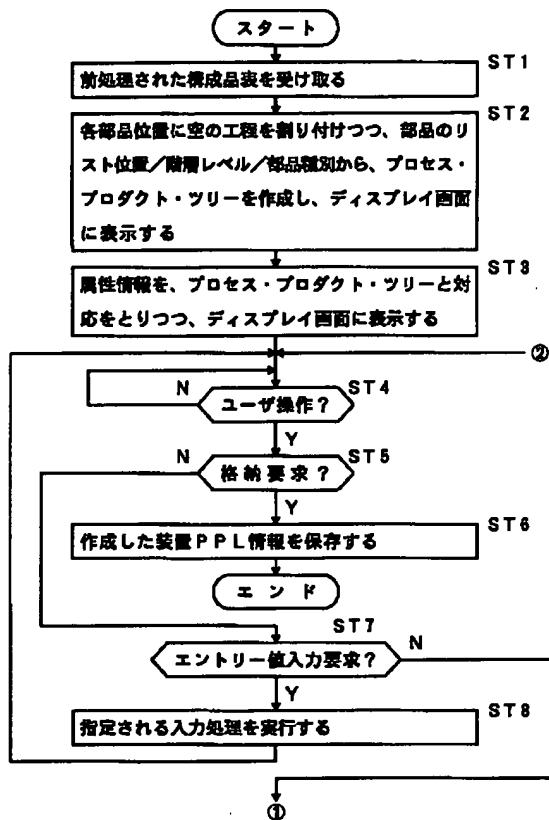
【図3】

## 前処理プログラムの実行する処理フロー



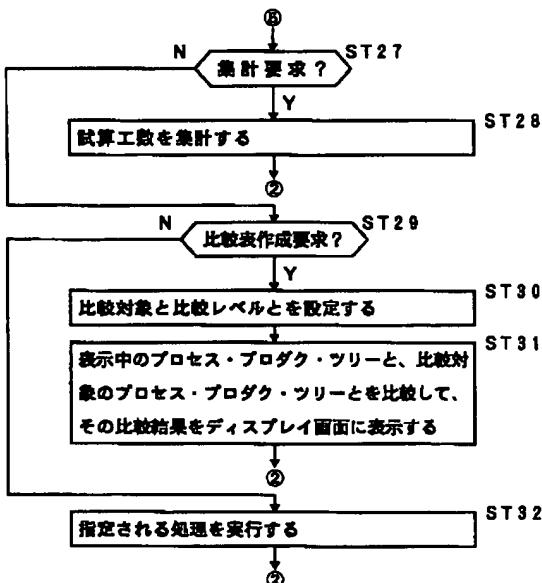
【図4】

## 装置PPL情報生成プログラムの実行する処理フロー

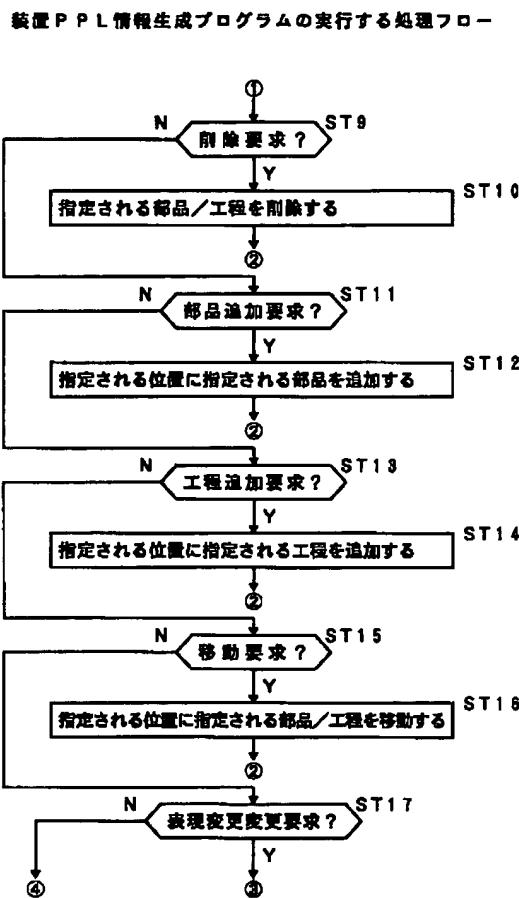


【図7】

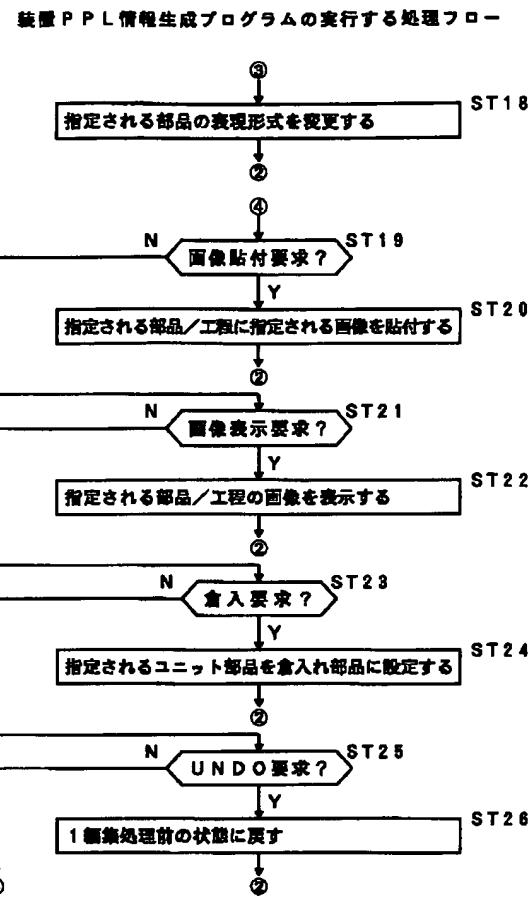
## 装置PPL情報生成プログラムの実行する処理フロー



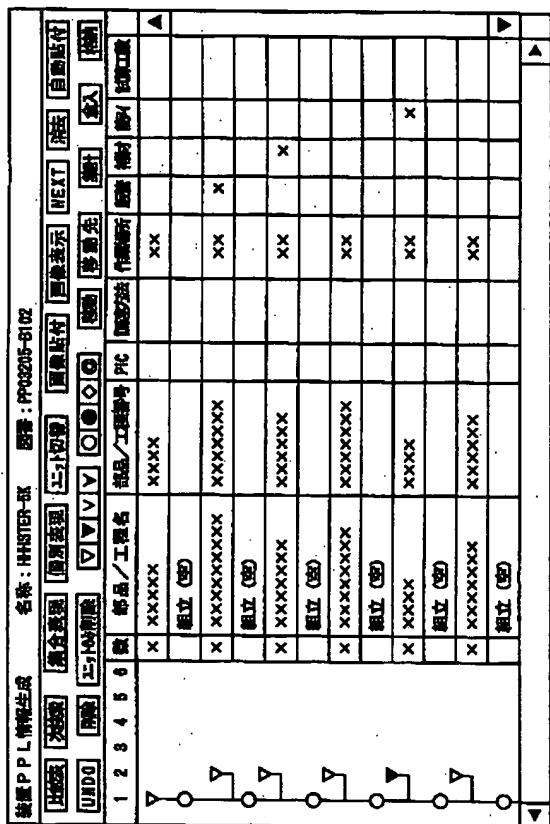
【図5】



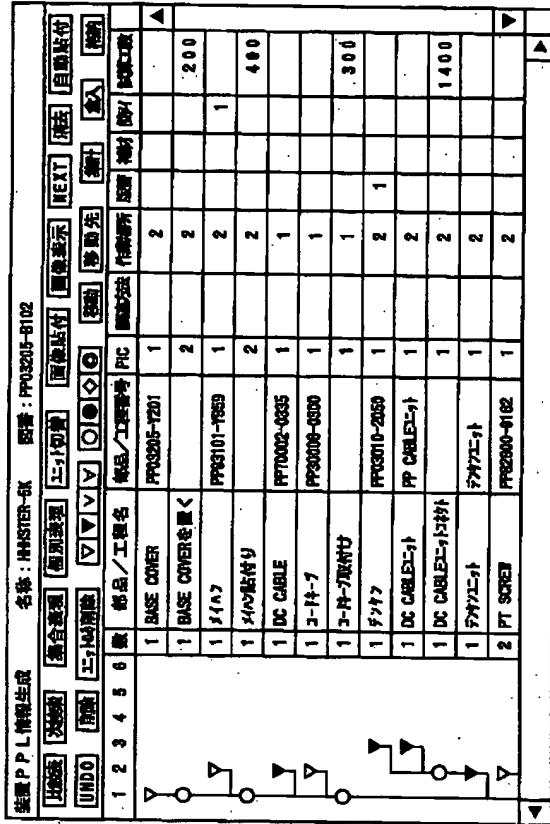
【図6】



### ディスプレイ画面の説明図



### ディスプレイ画面の説明図



【図10】

ディスプレイ画面の説明図

検査PPL情報生成　名前: fair1-cop-assy-16.asm　番号: FAIR-TP-ASSY-16.ASM

上部　方法　複合整理　複合整理　上位切替　異常表示　HEAT　送信　自動動作

UNDO　[削除]　[二段階削除]　△△△△△　○○○○○　△△△△△　多段元　削除　插入　插入

1 2 3 4 5 6 部品/工程名 部品/工程番号 RC 比較方法 比較結果 比較結果 比較結果

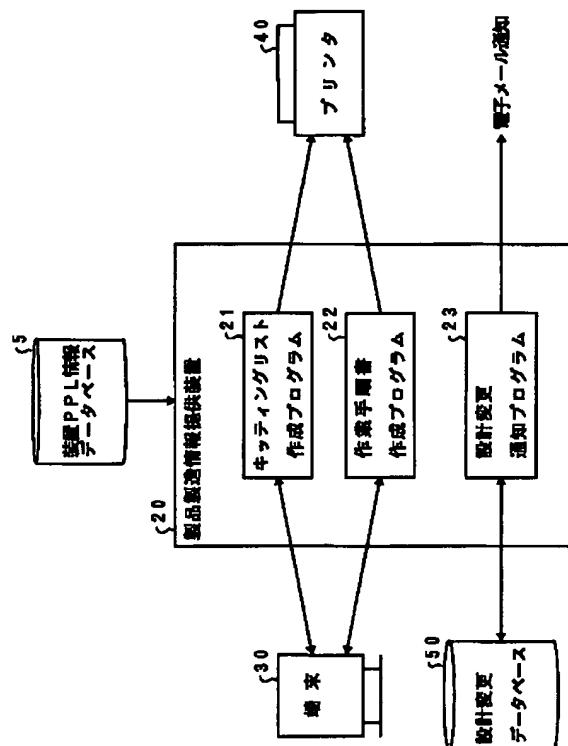
比較基準キー: 開始　名前: fair1-cop-assy-16.asm　fair1-cop-assy-16.asm

ツリー検索　比較結果

No	部品	名前	図番	比較元	比較対象	結果
1	P PIR PLATE	11base	XXXXXX	XXXXXX	XXXXXX	2 1 -1 ▲
2	P 基本部品	baseInd1	XXXXXX	3 1		1
3	U MB	PP00700-2600-011	XXXXXXXXXX	XXXXXXXXXX	5 1 -1	
4	P コネク	PP00200-001-011	XXXXXXXXXX	1 27 XXXXX	1 28 -2	

【図11】

本発明を利用するシステムの説明図



【図12】

## ディスプレイ画面の説明図

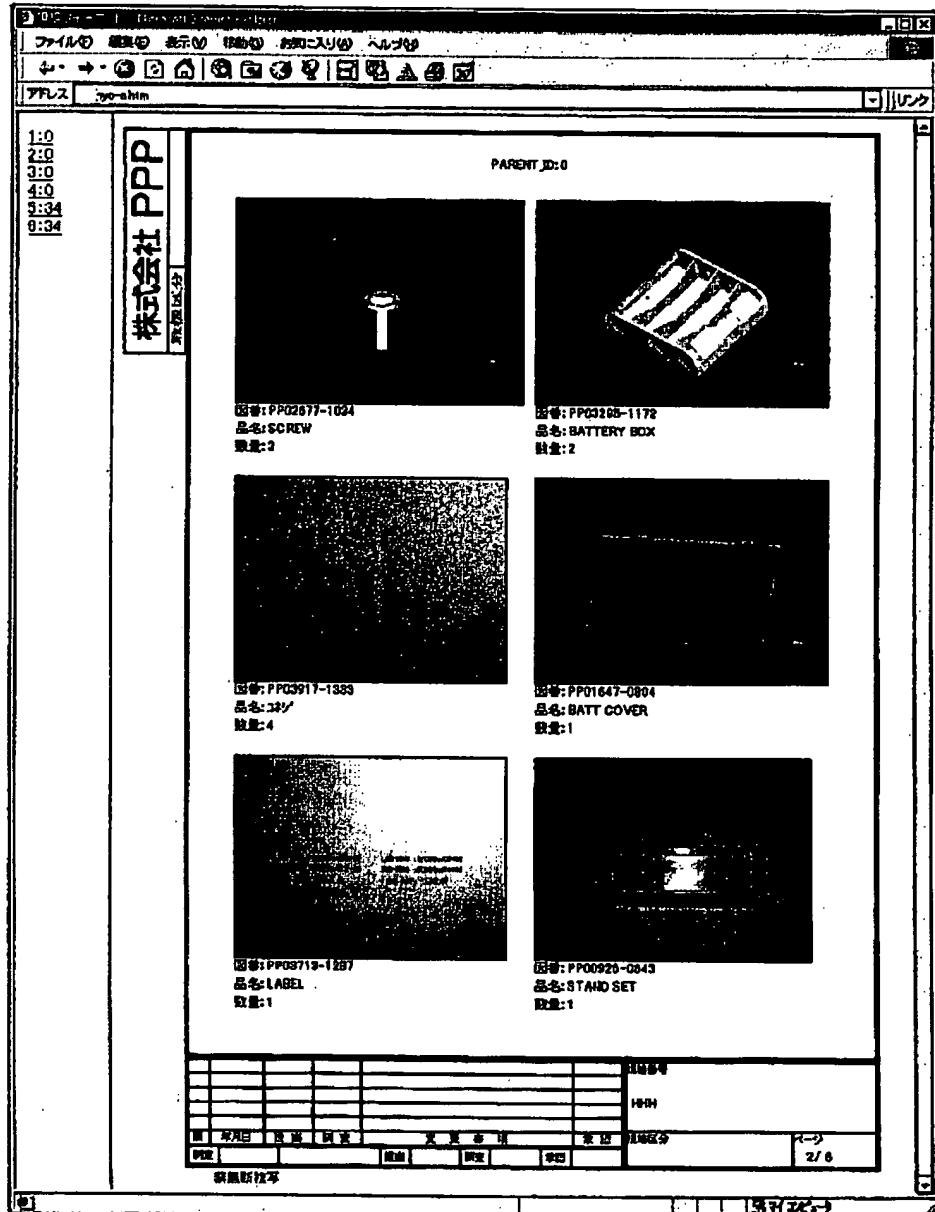
上記の列を押すと対象のデータ

ファイル(F) 編集(E) ヘルプ(H)

図番	品名	数量	イメージ
※ PP00102-0459	コードキーパー	1	PIC\PP00102-0459.JPG
※ PP00205-0482	フウト	1	PIC\PP00205-0482.JPG
○ PP00308-0505	CABLEユニット	1	
○ PP00411-0528	HHHユニット	1	PIC\PP00411-0528.JPG
※ PP00514-0561	ドリアンカセットメッシュ	1	
※ PP00617-0574	サービスモウチラセック	1	PIC\PP00617-0574.JPG
○ PP00720-0597	テツケン	1	PIC\PP00720-0597.JPG
○ PP00823-0620	HHH	1	PIC\PP00823-0620.JPG
※ PP00926-0643	STAND SET	1	PIC\PP00926-0643.JPG
○ PP01029-0666	TOP COVER ASSY	1	PIC\PP01029-0666.JPG
※ PP01132-0689	REAR PLATE	1	PIC\PP01132-0689.JPG
※ PP01235-0712	スペーサー(BT)	2	PIC\PP01235-0712.JPG
※ PP01441-0758	スペーサー(BC)	1	PIC\PP01441-0758.JPG
※ PP01544-0781	BASE COVER	1	PIC\PP01544-0781.JPG
※ PP01647-0804	BATT COVER	1	PIC\PP01647-0804.JPG
※ PP01750-0827	MB-HHH	1	PIC\PP01750-0827.JPG
※ PP01853-0860	DB-HHH	1	PIC\PP01853-0860.JPG
※ PP01956-0873	OP-HHH	1	PIC\PP01956-0873.JPG
※ PP02059-0896	CD-ROM	1	
※ PP02162-0919	ビジュラーコード	1	PIC\PP02162-0919.JPG
※ PP02265-0942	LANケーブル	1	PIC\PP02265-0942.JPG
※ PP02368-0965	USB CABLE	1	PIC\PP02368-0965.JPG
○ PP02471-0988	DC CABLE	1	PIC\PP02471-0988.JPG
○ PP02574-1011	AC CORD	1	PIC\PP02574-1011.JPG
※ PP02677-1034	SCREW	6	PIC\PP02677-1034.JPG
※ PP03295-1172	BATTERY BOX	2	PIC\PP03295-1172.JPG
※ PP03407-1218	スペーサー	1	PIC\PP03407-1218.JPG
※ PP03609-1241	メイパン	1	PIC\PP03609-1241.JPG
※ PP03611-1264	ホシウシ	1	PIC\PP03611-1264.JPG

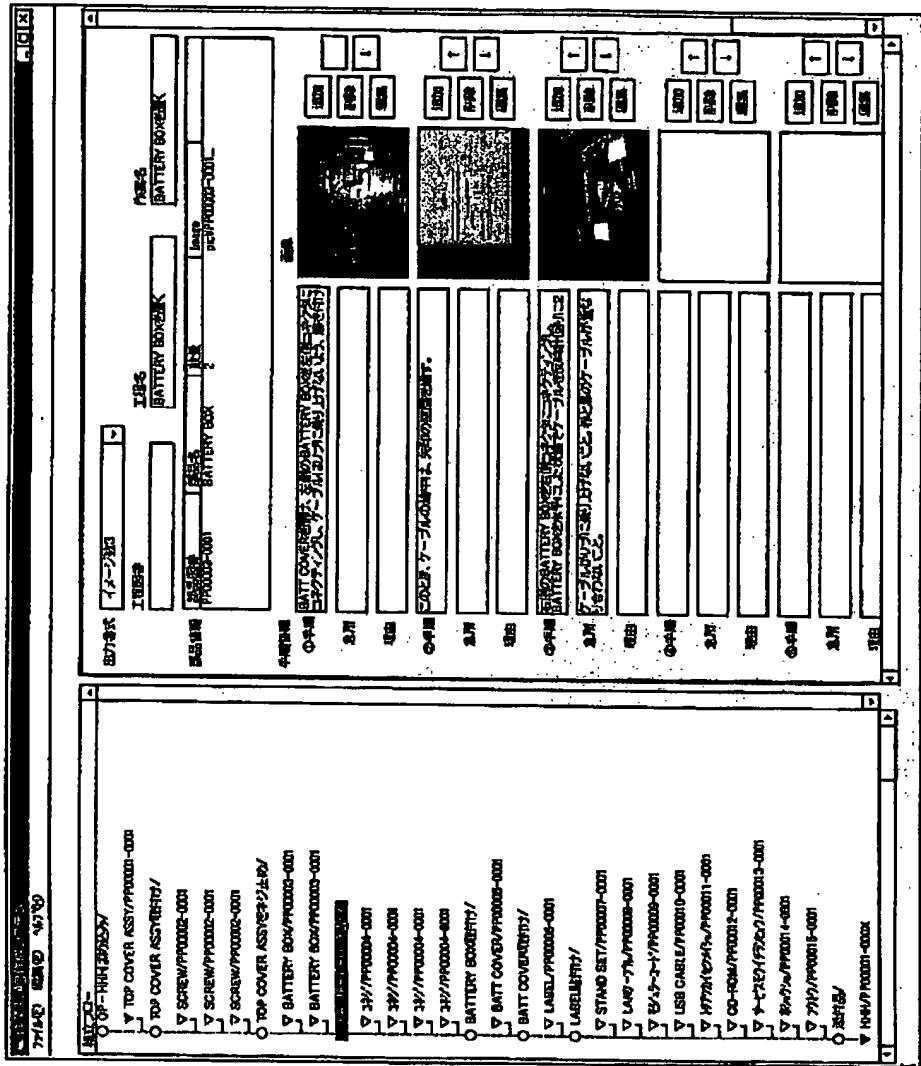
【図13】

## キッティングリストの説明図



【図14】

### ディスプレイ画面の説明図



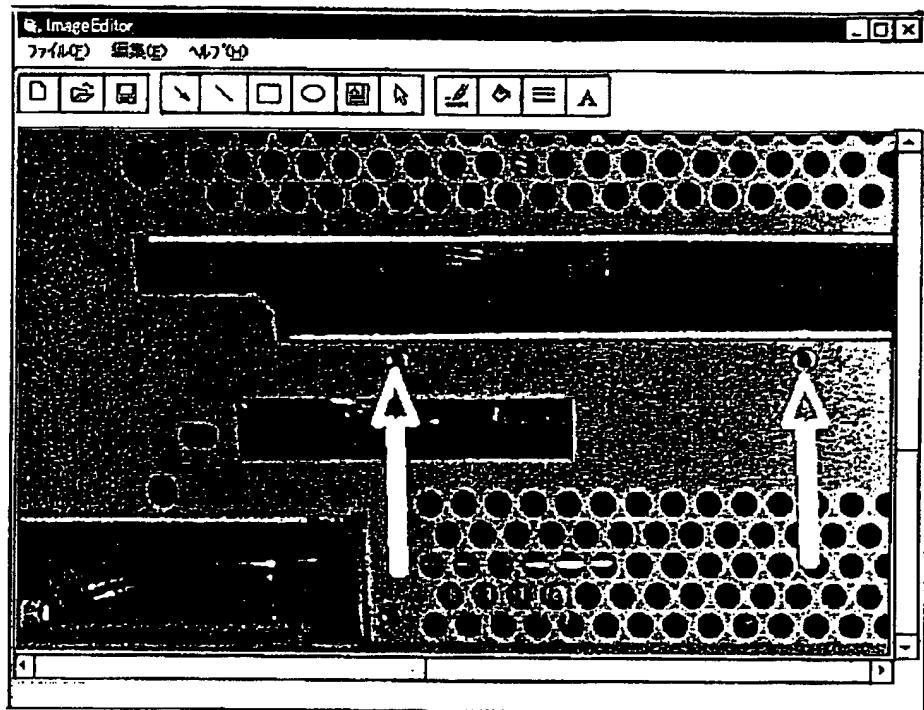
【図15】

ディスプレイ画面の説明図

出力形式	▼	工程番号	工程名	作業名
		<input type="text"/>	<input type="text"/>	<input type="text"/>
部品情報	部品番号	部品名	数量	Image
<input type="text"/>				
手順情報				
①手順	<input type="text"/>	<input type="text"/>	<input type="button" value="追加"/>	<input type="button" value="削除"/>
意所	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
理由	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
②手順	<input type="text"/>	<input type="text"/>	<input type="button" value="追加"/>	<input type="button" value="削除"/>
意所	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
理由	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
③手順	<input type="text"/>	<input type="text"/>	<input type="button" value="追加"/>	<input type="button" value="削除"/>
意所	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
理由	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
④手順	<input type="text"/>	<input type="text"/>	<input type="button" value="追加"/>	<input type="button" value="削除"/>
意所	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
理由	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
⑤手順	<input type="text"/>	<input type="text"/>	<input type="button" value="追加"/>	<input type="button" value="削除"/>
意所	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
理由	<input type="text"/>	<input type="text"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
⑥手順	<input type="text"/>	<input type="text"/>	<input type="button" value="追加"/>	<input type="button" value="削除"/>
<input type="text"/>				

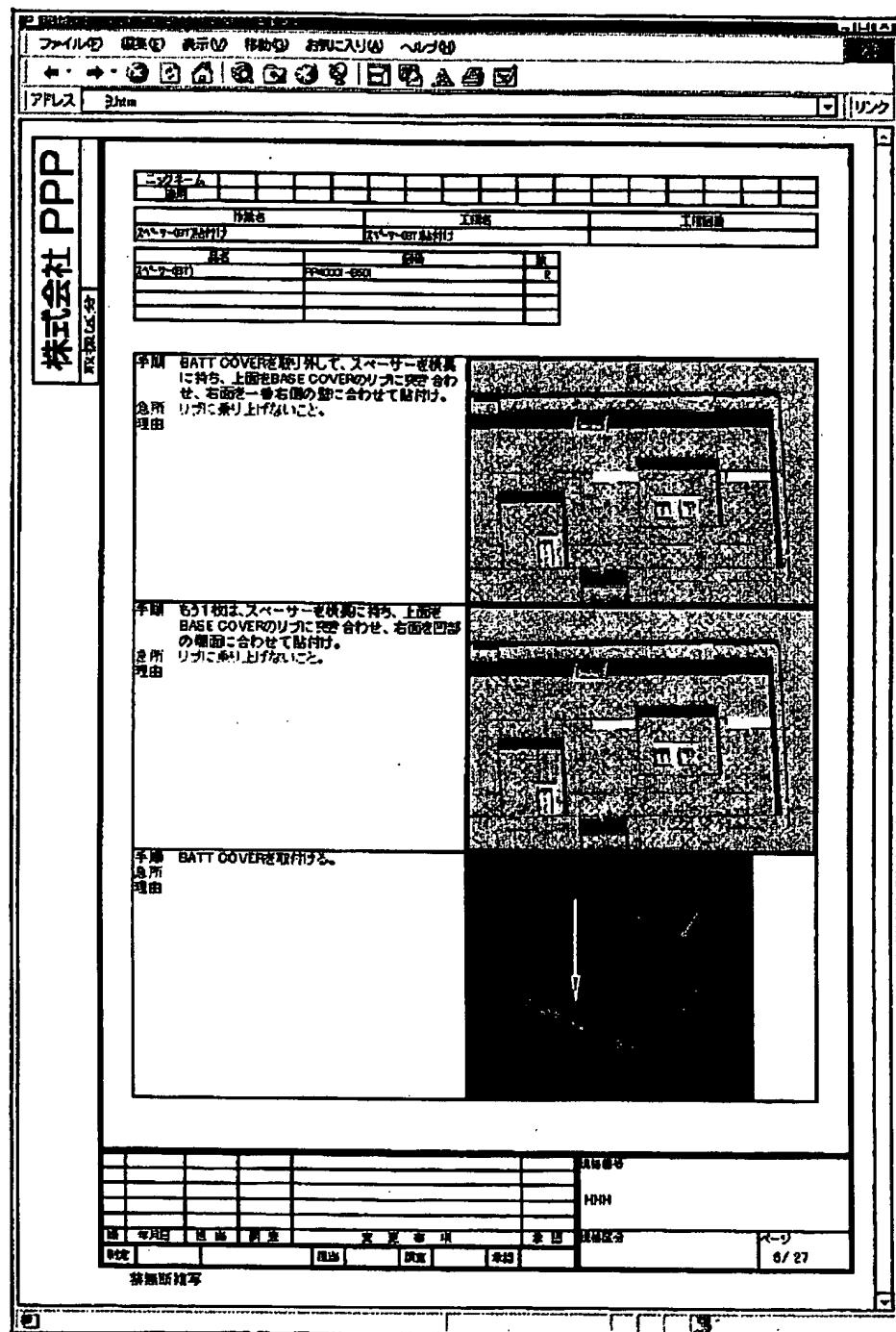
【図16】

ディスプレイ画面の説明図



【図17】

### 作業手順書の説明図



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F ターム(参考) 5B046 DA01 GA01 HA05  
5B049 AA04 BB07 CC21 DD01 DD05  
EE00 EE05 EE07 FF03 FF09  
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## CLAIMS

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### [Claim(s)]

[Claim 1] An acquisition means by which is product manufacturing information generation equipment which generates the product manufacturing information which is needed for manufacture of a product, and the component table of the product defined as a list of components comes to hand, While tree-structure-izing the component table which the above-mentioned acquisition means receives, displaying it according to the array location of a component, and the hierarchy level of a component and changing the array location and/or hierarchy level of a component if needed according to interactive processing Product manufacturing information generation equipment characterized by having a generation means to generate product manufacturing information by adding the process information which is needed for manufacture of a product, carrying out additional deletion of the component if needed, and an output means to output the product manufacturing information which the above-mentioned generation means generates.

[Claim 2] It is product manufacturing information generation equipment characterized by for a generation means displaying the input entry of the attribute information on a component in product manufacturing information generation equipment according to claim 1, and acquiring the attribute information on the component which is receiving the input value over the input entry, and is built into product manufacturing information.

[Claim 3] It is product manufacturing information generation equipment characterized by acquiring the attribute information on the component which is that a generation means accesses a data storage means in product manufacturing information generation equipment according to claim 1, and is built into product manufacturing information.

[Claim 4] It is product manufacturing information generation equipment characterized by generating product manufacturing information by assigning the image information specified to the component and/or process information that a generation means is specified in the product manufacturing information generation equipment indicated by either of claims 1-3.

[Claim 5] The product manufacturing-information generation equipment characterized by to have an extract means compares an input means input the product manufacturing information for [ which is specified ] a comparison in the product manufacturing-information generation equipment indicated by either of claims 1-4, and product manufacturing information on display with the product manufacturing information which the above-mentioned input means inputs, and extract and output the difference.

[Claim 6] The acquisition processing which is the program documentation medium by which the program used for implementation of the product manufacturing information generation equipment which generates the product manufacturing information which is needed for manufacture of a product is recorded, and receives the component table of the product defined as a list of components, While tree-structure-izing the component table which comes to hand by the above-mentioned acquisition processing, displaying it according to the array location of a component, and the hierarchy level of a component and changing the array location and/or hierarchy level of a component if needed according to interactive processing The generation processing which generates product manufacturing information by adding the process information which is needed for manufacture of a product, carrying out additional deletion of the component if needed, The program

documentation medium characterized by recording the program which makes a computer perform output processing which outputs the product manufacturing information generated by the above-mentioned generation processing.

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[Translation done.]

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

[Field of the Invention] This invention relates to the program documentation medium by which the program used for implementation of the product manufacturing information generation equipment which enables it to generate simply the product manufacturing information which is needed for manufacture of a product, and its equipment is recorded on the early phase of a product design.

[0002] If a product is designed, an industrial engineer is creating the product manufacturing information which consists of an assembly procedure etc. based on the design information, starts mass-production preparation of the product, and starts the mass production of the product.

[0003] In order to shorten the period to mass-production initiation, while enabling it to create this product manufacturing information in the early phase of a design, it is necessary to enable it to create this product manufacturing information simply.

**[0004]**

[Description of the Prior Art] Until now, by an industrial engineer's handicraft, it was processing so that product manufacturing information might be created.

[0005] However, if you are trying to create product manufacturing information by an industrial engineer's handicraft, while forcing an industrial engineer a great quantity of loads, there is a trouble that the creation takes huge time amount.

[0006] If such a thing is made into a background and the design information of a product is created by the CAD system recently, the configuration which displays a visual product in inputting the three-dimension model data will be taken, and the system of creating product manufacturing information by opting for the assembly procedure etc. in conversing with an industrial engineer through the product display will have been developed.

**[0007]**

[Problem(s) to be Solved by the Invention] To be sure, if this system is used, product manufacturing information can be created easily.

[0008] However, in this system, the three-dimension model data designed by the CAD system are inputted, and since the configuration of creating product manufacturing information in conversing with an industrial engineer using it is taken, there is a trouble that product manufacturing information cannot be created in the early phase of a product design.

[0009] That is, if it is not after the design by the CAD system is completed, since it does not put into creation of product manufacturing information, there is a trouble that product manufacturing information cannot be created in the early phase of a design.

[0010] Even if it will use this system from now on, the trouble that the period to mass-production initiation cannot be shortened remains.

[0011] This invention is made in view of this situation, and aims at offer of the new product manufacturing information generation equipment which enables it to generate simply the product manufacturing information which is needed for manufacture of a product in the early phase of a product design, and offer of the new program documentation medium by which the program used for implementation of the equipment is recorded.

[0012]

[Means for Solving the Problem] In order to attain this purpose, with the product manufacturing information generation equipment of this invention An acquisition means by which the component table of the product defined as a list of components comes to hand, While tree-structure-izing the component table which an acquisition means receives, displaying it according to the array location of a component, and the hierarchy level of a component and changing the array location and/or hierarchy level of a component if needed according to interactive processing A configuration equipped with a generation means to generate product manufacturing information by adding the process information which is needed for manufacture of a product, and an output means to output the product manufacturing information which a generation means generates is taken carrying out additional deletion of the component if needed.

[0013] Furthermore, an input means to input the product manufacturing information for [ which is specified ] a comparison, and product manufacturing information on display are compared with the product manufacturing information which an input means inputs, and it may have an extract means to extract and output the difference.

[0014] thus, with the product manufacturing information generation equipment of this invention constituted When an acquisition means receives the component table of the product defined as a list of components, a generation means While tree-structure-izing the component table which came to hand according to the array location of a component, and the hierarchy level of a component, displaying on a display screen and changing the array location and/or hierarchy level of a component if needed according to interactive processing Generating product manufacturing information by adding the process information which is needed for manufacture of a product, carrying out additional deletion of the component if needed, in response, an output means outputs the generated product manufacturing information.

[0015] The attribute information on the component which is a generation means' displaying the input entry of the attribute information on a component on a display screen, and receiving the input value over that input entry at this time, and is built into product manufacturing information may be acquired, or the attribute information on the component which is accessing a data storage means and is built into product manufacturing information may be acquired. Moreover, product manufacturing information may be generated by assigning the image information specified to the component and/or process information which are specified.

[0016] thus, with the product manufacturing information generation equipment of this invention The component table created by the early phase of a product design comes to hand, and it responds to the array location of a component, and the hierarchy level of a component. While tree-structure-izing the component table which came to hand, displaying on a display screen and editing into the form where the tree structure is fitted to product manufacture, according to interactive processing By adding the process information used as the procedure of product manufacture to the tree structure, since the configuration of generating the product manufacturing information which is needed for manufacture of a product is taken, product manufacturing information can be easily generated in the early phase of a product design.

[0017] While, being able to shorten the period to mass-production initiation sharply from now on, the quality of conformance of a product can be evaluated on a desk in the early phase of a product design, and the design of a product with a high quality of conformance can be realized by the ability of it to be fed back now to a design.

[0018]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail according to the gestalt of operation.

[0019] One example of the product manufacturing information generation equipment 1 which possesses this invention in drawing 1 is illustrated.

[0020] As shown in this drawing, the product manufacturing information generation equipment 1 of this invention Information, such as attribute information on the components stored in production and the product management database 3 by considering the component table stored in the component table database 2 as an input, Referring to the image information (what was photoed by the digital camera) of the components stored in the image file system 4 In order to perform processing which generates the product manufacturing

information (equipment PPL information is called hereafter) which is needed for manufacture of a product, and is stored in the equipment PPL information database 5 and to realize this processing The configuration equipped with the program of a preprocessor 10 and the equipment PPL information generator 11 is taken. [0021] Here, this preprocessor 10 and the equipment PPL information generator 11 are storable in a record medium with the suitable semiconductor memory which a computer can read.

[0022] As it is created by the early phase of a product design by the designer and is shown in drawing 2 , the component table stored in the component table database 2 consists of lists of components which constitute a product, and describes the name of article / part number / quantity of those components.

[0023] The list of the components described by this component table is determined in the form where the designer took the assembly sequence of a product into consideration. However, it is based on self-decision of a designer and, in the usual case, differs from what the industrial engineer who had full knowledge to manufacture judges greatly in many cases.

[0024] On the other hand, it roughly divides into the components described by the component table, and there are item components which consist of single components, and unit components which consist of that item components and other unit components are attached as them. The part number of components is used as a search key, it turns out whether the component is item components and whether they are unit components by searching production and the product management database 3, and further, in being unit components, it knows the item components and unit components which constitute it.

[0025] The component table has also described indirectly the hierarchy level (whenever it is attached to unit components, the hierarchy level of item components goes up by one) of each part article which constitutes a product while having also described indirectly the components classification of each part article which constitutes a product, so that this may show.

[0026] One example of the processing flow which the equipment PPL information generator 11 performs to one example, drawing 4 , or drawing 7 of the processing flow which a preprocessor 10 performs to drawing 3 is illustrated.

[0027] Next, according to these processing flows, the processing which the product manufacturing information generation equipment 1 of this invention performs is explained to a detail.

[0028] If a preprocessor 10 is started, as shown in the processing flow of drawing 3 , first, it will be step 1 and will input the component table of the product used as a processing object from the component table database 2.

[0029] Then, by using the part number of each part article described by the inputted component table as a search key, and searching production and the product management database 3 with step 2, the attribute information on each part article is acquired, and it matches with the components of a component table.

[0030] For example, the ways and means of the component, the work site of the component, the number of versions of the component, the information that it is whether it is that the component is auxiliary parts (screw etc.), the information that it is whether it is that the component is simple May Van (the so-called seal), etc. are acquired, and it matches with the components of a component table.

[0031] The information that it is whether it is auxiliary parts here, and the information that it is whether it is simple May Van have important semantics because a manufacture site must supply about those components, and he is trying to acquire those information from now on.

[0032] Then, while extracting the unit components described by the component table by using the part number of each part article described by the inputted component table as a search key, and searching production and the product management database 3 with step 3, those unit components are disassembled into item components by referring to production and the product management database 3 further. When unit components have unit components further at this time, it repeats decomposing it into item components.

[0033] And while specifying the hierarchy level of the item components described by the inputted component table and unit components according to this decomposition processing, the hierarchy level of the item components (it is also included when there are unit components) which constitute those unit components is specified.

[0034] The hierarchy level of the components which become the beginning described by the component table

for assembly Namely, "1", While defining the hierarchy level of the components described in the hierarchy level of the finished product described by the component table by the component table which will be directly attached to "1" and its finished product as "2" When disassembling unit components into item components (it is also included when there are unit components) When the definition approach of determining the hierarchy level of the disassembled components in the form lowered one from the hierarchy level of the unit components of a decomposing agency is used, according to this definition approach, the hierarchy level of the item components called for by decomposition processing and unit components is specified.

[0035] Furthermore, at this step 3, processing which acquires the attribute information on the item components called for by decomposition processing and unit components by referring to production and the product management database 3 is also performed.

[0036] Then, at step 4, the component table which added attribute information, the information on being unit components, and hierarchy level is passed to the equipment PPL information generator 11, and processing is ended.

[0037] Thus, a preprocessor 10 inputs the component table of the product which serves as a processing object from the component table database 2, and it processes it so that attribute information, the information on being unit components, and hierarchy level may be added to it.

[0038] In addition, when the component table consists of layered structures as the component table which describes the configuration of the unit components described by the component table is prepared independently, it becomes possible to specify the hierarchy level of a component by referring to the component table of this layered structure, without a preprocessor 10 searching production and the product management database 3.

[0039] In response to processing of this preprocessor 10, as shown in drawing 4 thru/or the processing flow of drawing 7 R> 7, first, the equipment PPL information generator 11 is step 1, and receives that pretreated component table.

[0040] Then, assigning an empty process to each part article location, (like an empty erector) from the list location / hierarchy level / components classification of the components described by the pretreated component table, a process product tree is created and it expresses to a display screen as step 2. That is, a system screen with screen structure as shown, for example in drawing 8 is displayed, and the process product tree created into the left-hand side part is displayed.

[0041] here -- the inside of this process product tree, and "/\*" -- item components -- "--" -- in unit components and "O", "1-6" express hierarchy level like the erector. Here, for convenience, the thing of explanation which a hierarchy level value becomes large is assumed, so that hierarchy level falls.

[0042] Then, it displays on a display screen, taking the components and correspondence which are described by the process product tree in the components name and the part number which are described by the pretreated component table at step 3, and the attribute information on the components matched with it. That is, the components name / part number / attribute information on the components described by the component table are displayed on a system screen, taking a process product tree and correspondence, as shown in drawing 8.

[0043] Then, it waits for the user actuation to a system screen at step 4. That is, since a user inputs a value into the input entry (fields other than a process product tree serve as an input entry) which a system screen has or directs the edit demand of a process product tree by operating the carbon button which a system screen has, he waits for those inputs.

[0044] If user actuation is detected at this step 4, when progress to step 5, judge whether it is having operated the "storing carbon button" which a user's shows in drawing 8 and judging that the user operated the "storing carbon button", it progresses to step 6, the equipment PPL information which created according to the processing to be explained from now on stores in an equipment PPL information database 5, and processing ends.

[0045] On the other hand, when judging that a user did not operate a "storing carbon button" at step 5 When progressing to step 7, judging whether it is that the user published the input request to an input entry and judging that the user published the input request After performing processing inputted into the input entry

which has the value which progresses to step 8 and is specified as it specified, it returns to step 4 that the next user actuation should be processed.

[0046] That is, it processes changing the attribute information read from production and the product management database 3, or, and changing the process name like the erector who initialized into the attribute information read from production and the product management database 3 to the attribute item which was not registered to the components added by processing mentioned later etc. [ inputting a value ] [ inputting a components name and the part number ]

[0047] On the other hand, when judging that a user did not publish the input request to an input entry at step 7 Progress to step 9 (processing flow of drawing 5 ), and it judges whether it is having operated the "deletion carbon button" which a user's shows in drawing 8 , and "only a unit's having been a deletion carbon button." When judging that the user operated a "deletion carbon button" and "only a unit having been a deletion carbon button", after editing a process product tree by deleting the components which progress to step 10 and are specified as it, and a process, it returns to step 4 that the next user actuation should be processed.

[0048] namely, when the item components which \*\* process product tree has are chosen and a "deletion carbon button" is operated after it When the selected item component is deleted, the unit components which \*\* process product tree has are chosen and a "deletion carbon button" is operated after it When the selected unit entire component is deleted, the unit components which \*\* process product tree has are chosen and "only a unit is a deletion carbon button" is operated after it It leaves about the components which constitute the selected unit component (hierarchy level is raised one). \*\*\*\*\*, Only the selected unit component is deleted, and when the process which \*\* process product tree has is chosen and a "deletion carbon button" is operated after it, the selected process is deleted.

[0049] In addition, about selection of components or a process, it is also possible to choose by not choosing the distinguishing mark on a process product tree, and choosing the line matched with it.

[0050] The carbon button with which it progresses to step 11 and a user directs addition of components at step 9 on the other hand when judging that a user did not operate a "deletion carbon button" and "only a unit having been a deletion carbon button" () [ "\*" shown in drawing 8 , and ] [ " ] ", when judging whether it is having operated "\*" and "\*" and judging that the user operated this components addition carbon button After editing a process product tree by adding the components specified as the additional location (a ruled line top location and unit components) which progresses to step 12 and is specified as it (hierarchy level under one), it returns to step 4 that the next user actuation should be processed.

[0051] At this time, according to the components classification of additional components, in the "name-of-article column" of an input entry, it is processing so that general names, such as "item components" and "unit components", may be inputted automatically.

[0052] the carbon button with which "\*" directs addition of item components here -- " " -- the carbon button which directs addition of unit components, the carbon button with which "\*" directs addition of the self-supply components which are not indicated in a component table, and "\*" are carbon buttons which direct addition of the unit components used as a \*\*\*\*\* object.

[0053] On the other hand, when judging that a user did not operate a components addition carbon button at step 11 Progress to step 13 and it judges whether it is having operated the carbon button ("O", "-", "<>", and "O" which are shown in drawing 8 ) with which a user's directs the addition of a process. When judging that the user operated this process addition carbon button, after editing a process product tree by adding the process specified as the additional location (ruled line top location) which progresses to step 14 and is specified as it, it returns to step 4 that the next user actuation should be processed.

[0054] At this time, according to the process classification like additional processing, in the "process name column" of an input entry, it is processing so that "assembly", "housekeeping", "a trial/inspection", and the general name "others" may be inputted automatically.

[0055] Here, the carbon button with which "O" directs the addition like an erector, the carbon button with which " " directs the addition of a housekeeping process, the carbon button which directs the addition of "<>" trial / inspection process, and "O" are carbon buttons which direct the addition of other processes.

[0056] On the other hand, when judging that a user did not operate a process addition carbon button at step

13 When progressing to step 15, judging whether it is having operated the "migration carbon button" which a user's shows to drawing 8 and judging that the user operated the "migration carbon button" After editing a process product tree by moving the components specified and a process to the migration place location (a ruled line top location, unit components, and the migration place of a process being a ruled line top location for the migration place of components) which progresses to step 16 and is specified as it, it returns to step 4 that the next user actuation should be processed.

[0057] namely, when the item components which \*\* process product tree has are chosen, a migration place is specified after it and a "migration place carbon button" is operated Move the selected item component to the migration place, and the unit components which \*\* process product tree has are chosen. When a migration place is specified after it and a "migration place carbon button" is operated The components which the selected unit component and its unit component have are moved to the migration place. \*\* The process which a process product tree has is chosen, and when a migration place is specified after it and a "migration place carbon button" is operated, move the selected process to the migration place.

[0058] Here, it is processing so that it may move automatically in this migration according to it also about the name / number / attribute information on components or a process used as the candidate for migration.

[0059] On the other hand, when judging that a user did not operate a "migration carbon button" at step 15 Progress to step 17 and it judges whether it is having operated the carbon button (the "set expression carbon button", the "individual attached table present carbon button", and the "unit change carbon button" which are shown in drawing 8 ) with which a user's directs modification of the transcription of components. When judging that the user operated this transcription modification carbon button After editing a process product tree by performing modification processing of the transcription specified as step 18 (processing flow of drawing 6 ) to the components progressed and specified, it returns to step 4 that the next user actuation should be processed.

[0060] namely, when the components which a process product tree has are chosen and a "set expression carbon button" is operated after it While summarizing the line matched with the selected component, and the line with the same data which continues up and down as one line an input entry -- "-- more than -- the transcription of a process product tree is changed by registering into column" the line count summarized to one (the same components by which continuation arrangement is carried out are packed into one).

[0061] and when the components which a process product tree has are chosen and an "individual attached table present carbon button" is operated after it the line matched with the selected component -- an input entry -- "-- more than, while decomposing into the line for several minutes registered into column" an input entry -- "-- more than -- the transcription of a process product tree is changed by registering "1" into column", respectively (the components packed into one are disassembled separately).

[0062] And when the unit components which a process product tree has are chosen and a "unit change carbon button" is operated after it, while specifying the components and process which are included in the selected unit component and eliminating from on a screen, the transcription of a process product tree is changed by changing the foreground color of the selected unit component into a regular thing.

[0063] And when the unit components with which the foreground color was changed are chosen and a "unit change carbon button" is operated after it, while specifying the components and process which are included in the selected unit component and carrying out regeneration on a screen, the transcription of a process product tree is changed by changing the foreground color of the selected unit component into the original thing.

[0064] On the other hand, when judging that a user did not operate a transcription modification carbon button at step 17 (processing flow of drawing 5 ) Progress to step 19 (processing flow of drawing 6 ), and it judges whether it is having operated the "image pasting carbon button" which a user's shows in drawing 8 , and the "automatic pasting carbon button." When judging that the user operated the "image pasting carbon button" and the "automatic pasting carbon button", after sticking the image specified as the components which progress to step 20 and are specified as it, or a process, it returns to step 4 that the next user actuation should be processed.

[0065] namely, when the components which a process product tree has are chosen and a "image pasting carbon button" is operated after it While sticking the image (for example, image of the selected components)

which takes the configuration which displays a list of the image stored in the image file specified, and is chosen from them on the selected component By registering the number of the images stuck on the "PIC column" of an input entry, an image is stuck on the components which the user chose.

[0066] and when the process which a process product tree has is chosen and a "image pasting carbon button" is operated after it While sticking the image (for example, image in which the assembly procedure of the components in the selected process is shown) which takes the configuration which displays a list of the image stored in the image file specified, and is chosen from them on the selected process By registering the number of the images stuck on the "PIC column" of an input entry, an image is stuck on the process which the user chose.

[0067] and when the components which a process product tree has are chosen and a "automatic pasting carbon button" is operated after it While taking the configuration which specifies the image which the part number of the selected component points out by making the image stored in the image file specified applicable to pasting and sticking the specified image on the selected component By registering the number of the images stuck on the "PIC column" of an input entry, automatic pasting of the image is carried out at the components which the user chose.

[0068] and when the process which a process product tree has is chosen and a "automatic pasting carbon button" is operated after it The image stored in the image file specified is made applicable to pasting, and it is the operation number (when performing this processing) of that selected process. beforehand -- an operation number -- it is necessary to register, while taking the configuration which specifies the image to point out and sticking the specified image on the selected process By registering the number of the images stuck on the "PIC column" of an input entry, automatic pasting of the image is carried out at the process which the user chose.

[0069] In addition, as that as which all the components and processes were chosen, when a "automatic pasting carbon button" is operated without choosing components and a process, it is processing so that automatic pasting processing of this image may be performed.

[0070] Here, if an "elimination carbon button" is operated while displaying on a display screen using the "image display carbon button" explained below, this stuck image will be processed as that registration is eliminated.

[0071] On the other hand, when judging that a user did not operate a "image pasting carbon button" and a "automatic pasting carbon button" at step 19 When progressing to step 21, judging whether it is having operated the "image display carbon button" which a user's shows in drawing 8 and judging that the user operated the "image display carbon button" After displaying the image stuck on the components which progress to step 22 and are specified as it, or a process on a system screen, it returns to step 4 that the next user actuation should be processed.

[0072] namely, when the components and process which a process product tree has are chosen and an "image display carbon button" is operated after it While displaying the image stuck on the selected components and process, when two or more images are stuck, actuation of the "NEXT carbon button" is answered and the image stuck in an order from the image stuck on a head is displayed on a system screen.

[0073] On the other hand, when judging that a user did not operate an "image display carbon button" at step 21 When progressing to step 23, judging whether it is having operated the "warehouse ON carbon button" which a user's shows in drawing 8 and judging that the user operated the "warehouse ON carbon button" After setting the unit components which progress to step 24 and are specified as it as \*\*\*\*\* components, it returns to step 4 that the next user actuation should be processed.

[0074] namely, -- when the unit components which a process product tree has are chosen and a "warehouse ON carbon button" is operated after it, while specifying the components and process which are included in the selected unit component and eliminating from on a screen -- the distinguishing mark of the selected unit component -- -- The unit components which the user chose from " by changing into "\*\*" are changed into \*\*\*\*\* components.

[0075] On the other hand, when judging that a user did not operate a "warehouse ON carbon button" at step 23 When progressing to step 25, judging whether it is having operated the "UNDO carbon button" which a

user's shows in drawing 8 and judging that the user operated the "UNDO carbon button" After progressing to step 26 and returning to the condition before 1 edit processing, it returns to step 4 that the next user actuation should be processed.

[0076] That is, if the "UNDO carbon button" is operated while performing additional processing of components before the "UNDO carbon button" is operated, as it said that it returned to the condition before performing the additional processing, it will return to the condition before 1 edit processing.

[0077] Thus, the process product tree displayed on a system screen will be edited by the industrial engineer by repeating processing of step 4 – step 26, and it will complete in the form as this shows to drawing 9.

[0078] One line is assigned to each part article and each process which are described by the process product tree, and he is trying to display the attribute information which each part article and each process have here using this one line, as shown in this drawing.

[0079] On the other hand, when judging that a user did not operate the "UNDO carbon button" at step 25 When progressing to step 27 (processing flow of drawing 7 ), judging whether it is having operated the "total carbon button" which a user's shows in drawing 8 and judging that the user operated the "total carbon button" After progressing to step 28, totaling the trial calculation man day inputted into the "trial calculation man day column" of an input entry and displaying the summary value on a last line, it returns to step 4 that the next user actuation should be processed.

[0080] That is, the total process time amount which completion of the product used as a processing object takes by totaling the trial calculation man day (for example, the second being described as a unit) inputted into the "trial calculation man day column" of an input entry is totaled, and it processes so that it may be displayed.

[0081] Although it is also good for an industrial engineer to input, the trial calculation man day inputted into this the "trial calculation man day column" is good by acquiring it and inputting automatically into the "trial calculation man day column", when production and the product management database 3 have taken the configuration which uses an operation number as a search key and manages a standard trial calculation man day. However, when performing this processing, it is necessary to register an operation number beforehand.

[0082] When judging that progressed to step 29, judged whether it was having operated the "comparison table carbon button" which a user's shows in drawing 8 , and the user, on the other hand, operated the "comparison table carbon button" at step 27 when judging that a user did not operate a "total carbon button", it progresses to step 30 and the process product tree and comparison level for a comparison are set up.

[0083] That is, when a "comparison table carbon button" is operated, the difference is extracted by comparing a process product tree on display on a system screen with the process product tree for a comparison, and since processing in which it is displayed on a system screen is performed, the process product tree and comparison level for a comparison are set up so that it may explain from now on.

[0084] Setting processing of the process product tree for [ this ] a comparison is performed by taking the configuration which displays a list of the process product tree which is stored for example, in the file for a comparison, and which was created until now, and making a process product tree choose from that inside.

[0085] Moreover, set up the comparison level that setting processing of this comparison level extracts the components with which for example, \*\* drawing number (matched with the part number) is different. \*\* The same drawing number also sets up the comparison level of regarding it as the components which are different about the components with which parent drawing numbers differ, by a drawing number being different and being alike. \*\* Carry out by a parent drawing number differing from a drawing number, and the same drawing number and the same parent drawing number also displaying a selection screen with the alternative of setting up the comparison level of regarding it as the components which are different about the components with which hierarchy level differs, by being alike, and making it choose from them.

[0086] Then, after reading the equipment PPL information for a comparison from the equipment PPL information database 5, extracting the difference by comparing the read process product tree which equipment PPL information has with a process product tree on display on a system screen and expressing it as step 31 on a system screen, it returns to step 4 that the next user actuation should be processed.

[0087] That is, it is a form as shown, for example in drawing 10 , and the difference between the two process

product trees is displayed. When a user operates the "tree-search carbon button" which specifies the line number of a comparison table and a comparison table has at this time By matching cursor with the process product tree part used as the part of the difference Cursor is matched with the following process product tree part used as the part of the difference when a user operates the "retrieval [ degree ] carbon button" which a system screen has, while it is shown what part is different.

[0088] In addition, when the direction of the process product tree on display which becomes a comparing agency does not have the part which serves as a difference by few things, it is processing so that cursor may be matched with the location which a parent drawing number points out. Furthermore, when a user operates the "comparison table storing carbon button" which a comparison table has, it is processing so that it may store in the file which has the created comparison table specified.

[0089] By the comparison result shown in drawing 10 , here at the 1st line of a comparison table with the product of a process product tree on display It is shown that there are few an item components (PWR PLATE, 11base). By the 2nd line of a comparison table with the product of a process product tree on display It is shown that there are many an item components (a radical headquarters article and buhin01). By the 3rd line of a comparison table with the product of a process product tree on display It is shown that there are few a unit components (MB, pa00700-258 k-prt), and the 4th line of a comparison table shows that there are few two self-supply components (KONEJI, ru6sw2n3-061-prt) with the product of a process product tree on display.

[0090] By this comparison function being prepared, when a design change etc. occurs, the difference in components or a process can be extracted easily.

[0091] On the other hand, when judging that a user did not operate a "comparison table carbon button" at step 29, it progresses to step 32, and after performing processing which user actuation specifies, it returns to step 4 that the next user actuation should be processed.

[0092] Thus, if the component table where attribute information, components classification, and hierarchy level were added is received from a preprocessor 10, the equipment PPL information generator 11 will display the process product tree which the component table specifies as an initial tree, will edit it in conversing with an industrial engineer, and will complete a process product tree in the form based on an industrial engineer's know-how.

[0093] Thus, the process product tree completed While describing it is necessary what kind of component to prepare although the product of a processing object is manufactured As it said, "They are attachment, after that, it, D item components, and E unit components about attachment, after that, it, and C unit components in B item components to A item components of the body of a product Attachment and ...." It has described in what kind of procedure those components should be assembled.

[0094] Furthermore, while the attribute information on components or a process which is needed for manufacture of the product of a processing object matches and is described by this process product tree, an image matches and is registered into it. Therefore, it can be said that the completed process product tree has described all the manufacturing information that is needed in manufacturing the product of a processing object.

[0095] After this, an industrial engineer can evaluate now on a desk the quality of conformance of the product designed in the early phase of a design after this according to the information (equipment PPL information) displayed on this system screen.

[0096] An example of product manufacturing information offer equipment 20 which performs offer service of product manufacturing information is illustrated using the equipment PPL information generated by doing in this way by drawing 11 .

[0097] This product manufacturing information offer equipment 20 performs offer service of product manufacturing information using the chitin grist creation program 21, the work procedure instruction sheet creation program 22, and the program of the design change notice program 23.

[0098] This chitin grist creation program 21 will extract only components information from that equipment PPL information by removing process information, if equipment PPL information is read from the equipment PPL information database 5.

[0099] And a part list as shown in drawing 12 is created by setting up the classification approach (for example,

the classification approach of carrying out a group ping for every work site) of those components information, and classifying those components information according to conversing with an industrial engineer through a terminal 30 according to the classification approach (for example, according to work site) specified.

[0100] When it removes for an output about unit components, only unit components are made applicable to an output to a user at this time or all components are made applicable to an output, it is made to choose, and the components made applicable to an output according to that selection are determined, and a part list is displayed in the form which specifies whether they are the components made applicable to an output.

[0101] And following the format which carries out a newpage, when a classification changes, the list of images of each part article (visual chitin grist) made applicable to an output as shown in drawing 13 is created, and it can be printed by the printer 40 or it enables it to peruse by registering with a WEB server.

[0102] thus, in manufacturing a product, by the visual chitin grist (it having matched with the image of components and the nomenclature and the drawing number of the component also being described) created being prepared, the operator who manufactures a product prepares what kind of component -- it can kick -- it can grasp now correctly and easily whether it becomes.

[0103] On the other hand, the work procedure instruction sheet creation program 22 will display an input screen as shown in drawing 14 on the display screen of a terminal 30, if equipment PPL information is read from the equipment PPL information database 5. That is, an input screen with the process product tree which equipment PPL information has, and an input entry as shown in drawing 15 is displayed.

[0104] And document information which is described by the read process product tree which equipment PPL information has in conversing with an industrial engineer using this input screen and which it works in what kind of procedure, and what kind of thing has become the vital part of an activity for every process, and says that that reason is like this is created. It is made for the procedure of an activity to become intelligible by writing in an arrow head, an alphabetic character, etc. there at this time, as the image stuck on the process is displayed and it is shown in drawing 16.

[0105] And it can print by the printer 40 or enables it to peruse by registering with a WEB server by making into a work procedure instruction sheet document information as shown in drawing 17 which carried out in this way and was created.

[0106] Thus, in manufacturing a product, the operator who manufactures a product by the work procedure instruction sheet drawn up being prepared can grasp correctly and easily whether an activity must be done according to what kind of procedure, being cautious of what kind of thing.

[0107] On the other hand, the design change notice program 23 is accessing the design-change database 50 periodically, and confirms whether to be that there is a product by which the design change was carried out. And when judging that there is a product by which the design change was carried out, by accessing the equipment PPL information database 5, ID of the equipment PPL information on the product is acquired, and the industrial engineer of the charge registered by matching with equipment PPL information the information on the ID and the design-change information acquired from the design-change database 50 is notified by E-mail.

[0108] By this design change notice program 23 being prepared, an industrial engineer can cope with it suitable for a design change by the ability of the equipment PPL information on that product to be quickly accessed now, when the design change of a product is performed.

[0109]

[Effect of the Invention] As explained above, the component table created by the early phase of a product design in this invention comes to hand. While tree-structure-izing the component table which came to hand, displaying on a display screen according to the array location of a component, and the hierarchy level of a component and editing into the form where the tree structure is fitted to product manufacture, according to interactive processing By adding the process information used as the procedure of product manufacture to the tree structure, since the configuration of generating the product manufacturing information which is needed for manufacture of a product is taken, product manufacturing information can be easily generated in the early phase of a product design.

[0110] While, being able to shorten the period to mass-production initiation sharply from now on, the quality of

conformance of a product can be evaluated on a desk in the early phase of a product design, and the design of a product with a high quality of conformance can be realized by the ability of it to be fed back now to a design.

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[Translation done.]

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to the program documentation medium by which the program used for implementation of the product manufacturing information generation equipment which enables it to generate simply the product manufacturing information which is needed for manufacture of a product, and its equipment is recorded on the early phase of a product design.

[0002] If a product is designed, an industrial engineer is creating the product manufacturing information which consists of an assembly procedure etc. based on the design information, starts mass-production preparation of the product, and starts the mass production of the product.

[0003] In order to shorten the period to mass-production initiation, while enabling it to create this product manufacturing information in the early phase of a design, it is necessary to enable it to create this product manufacturing information simply.

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**PRIOR ART**

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[Description of the Prior Art] Until now, by an industrial engineer's handicraft, it was processing so that product manufacturing information might be created.

[0005] However, if you are trying to create product manufacturing information by an industrial engineer's handicraft, while forcing an industrial engineer a great quantity of loads, there is a trouble that the creation takes huge time amount.

[0006] If such a thing is made into a background and the design information of a product is created by the CAD system recently, the configuration which displays a visual product in inputting the three-dimension model data will be taken, and the system of creating product manufacturing information by opting for the assembly procedure etc. in conversing with an industrial engineer through the product display will have been developed.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] As explained above, the component table created by the early phase of a product design in this invention comes to hand. While tree-structure-izing the component table which came to hand, displaying on a display screen according to the array location of a component, and the hierarchy level of a component and editing into the form where the tree structure is fitted to product manufacture, according to interactive processing. By adding the process information used as the procedure of product manufacture to the tree structure, since the configuration of generating the product manufacturing information which is needed for manufacture of a product is taken, product manufacturing information can be easily generated in the early phase of a product design.

[0110] While, being able to shorten the period to mass-production initiation sharply from now on, the quality of conformance of a product can be evaluated on a desk in the early phase of a product design, and the design of a product with a high quality of conformance can be realized by the ability of it to be fed back now to a design.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] To be sure, if this system is used, product manufacturing information can be created easily.

[0008] However, in this system, the three-dimension model data designed by the CAD system are inputted, and since the configuration of creating product manufacturing information in conversing with an industrial engineer using it is taken, there is a trouble that product manufacturing information cannot be created in the early phase of a product design.

[0009] That is, if it is not after the design by the CAD system is completed, since it does not put into creation of product manufacturing information, there is a trouble that product manufacturing information cannot be created in the early phase of a design.

[0010] Even if it will use this system from now on, the trouble that the period to mass-production initiation cannot be shortened remains.

[0011] This invention is made in view of this situation, and aims at offer of the new product manufacturing information generation equipment which enables it to generate simply the product manufacturing information which is needed for manufacture of a product in the early phase of a product design, and offer of the new program documentation medium by which the program used for implementation of the equipment is recorded.

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[Translation done.]

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## MEANS

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[Means for Solving the Problem] In order to attain this purpose, with the product manufacturing information generation equipment of this invention An acquisition means by which the component table of the product defined as a list of components comes to hand, While tree-structure-izing the component table which an acquisition means receives, displaying it according to the array location of a component, and the hierarchy level of a component and changing the array location and/or hierarchy level of a component if needed according to interactive processing A configuration equipped with a generation means to generate product manufacturing information by adding the process information which is needed for manufacture of a product, and an output means to output the product manufacturing information which a generation means generates is taken carrying out additional deletion of the component if needed.

[0013] Furthermore, an input means to input the product manufacturing information for [ which is specified ] a comparison, and product manufacturing information on display are compared with the product manufacturing information which an input means inputs, and it may have an extract means to extract and output the difference.

[0014] thus, with the product manufacturing information generation equipment of this invention constituted When an acquisition means receives the component table of the product defined as a list of components, a generation means While tree-structure-izing the component table which came to hand according to the array location of a component, and the hierarchy level of a component, displaying on a display screen and changing the array location and/or hierarchy level of a component if needed according to interactive processing Generating product manufacturing information by adding the process information which is needed for manufacture of a product, carrying out additional deletion of the component if needed, in response, an output means outputs the generated product manufacturing information.

[0015] The attribute information on the component which is a generation means' displaying the input entry of the attribute information on a component on a display screen, and receiving the input value over that input entry at this time, and is built into product manufacturing information may be acquired, or the attribute information on the component which is accessing a data storage means and is built into product manufacturing information may be acquired. Moreover, product manufacturing information may be generated by assigning the image information specified to the component and/or process information which are specified.

[0016] thus, with the product manufacturing information generation equipment of this invention The component table created by the early phase of a product design comes to hand, and it responds to the array location of a component, and the hierarchy level of a component. While tree-structure-izing the component table which came to hand, displaying on a display screen and editing into the form where the tree structure is fitted to product manufacture, according to interactive processing By adding the process information used as the procedure of product manufacture to the tree structure, since the configuration of generating the product manufacturing information which is needed for manufacture of a product is taken, product manufacturing information can be easily generated in the early phase of a product design.

[0017] While, being able to shorten the period to mass-production initiation sharply from now on, the quality of conformance of a product can be evaluated on a desk in the early phase of a product design, and the design of a product with a high quality of conformance can be realized by the ability of it to be fed back now to a design.

[0018]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail according to the gestalt of operation.

[0019] One example of the product manufacturing information generation equipment 1 which possesses this invention in drawing 1 is illustrated.

[0020] As shown in this drawing, the product manufacturing information generation equipment 1 of this invention Information, such as attribute information on the components stored in production and the product management database 3 by considering the component table stored in the component table database 2 as an input, Referring to the image information (what was photoed by the digital camera) of the components stored in the image file system 4 In order to perform processing which generates the product manufacturing information (equipment PPL information is called hereafter) which is needed for manufacture of a product, and is stored in the equipment PPL information database 5 and to realize this processing The configuration equipped with the program of a preprocessor 10 and the equipment PPL information generator 11 is taken.

[0021] Here, this preprocessor 10 and the equipment PPL information generator 11 are storable in a record medium with the suitable semiconductor memory which a computer can read.

[0022] As it is created by the early phase of a product design by the designer and is shown in drawing 2 , the component table stored in the component table database 2 consists of lists of components which constitute a product, and describes the name of article / part number / quantity of those components.

[0023] The list of the components described by this component table is determined in the form where the designer took the assembly sequence of a product into consideration. However, it is based on self-decision of a designer and, in the usual case, differs from what the industrial engineer who had full knowledge to manufacture judges greatly in many cases.

[0024] On the other hand, it roughly divides into the components described by the component table, and there are item components which consist of single components; and unit components which consist of that item components and other unit components are attached as them. The part number of components is used as a search key, it turns out whether the component is item components and whether they are unit components by searching production and the product management database 3, and further, in being unit components, it knows the item components and unit components which constitute it.

[0025] The component table has also described indirectly the hierarchy level (whenever it is attached to unit components, the hierarchy level of item components goes up by one) of each part article which constitutes a product while having also described indirectly the components classification of each part article which constitutes a product, so that this may show.

[0026] One example of the processing flow which the equipment PPL information generator 11 performs to one example, drawing 4 , or drawing 7 of the processing flow which a preprocessor 10 performs to drawing 3 is illustrated.

[0027] Next, according to these processing flows, the processing which the product manufacturing information generation equipment 1 of this invention performs is explained to a detail.

[0028] If a preprocessor 10 is started, as shown in the processing flow of drawing 3 , first, it will be step 1 and will input the component table of the product used as a processing object from the component table database 2.

[0029] Then, by using the part number of each part article described by the inputted component table as a search key, and searching production and the product management database 3 with step 2, the attribute information on each part article is acquired, and it matches with the components of a component table.

[0030] For example, the ways and means of the component, the work site of the component, the number of versions of the component, the information that it is whether it is that the component is auxiliary parts (screw etc.), the information that it is whether it is that the component is simple May Van (the so-called seal), etc. are acquired, and it matches with the components of a component table.

[0031] The information that it is whether it is auxiliary parts here, and the information that it is whether it is simple May Van have important semantics because a manufacture site must supply about those components,

and he is trying to acquire those information from now on.

[0032] Then, while extracting the unit components described by the component table by using the part number of each part article described by the inputted component table as a search key, and searching production and the product management database 3 with step 3, those unit components are disassembled into item components by referring to production and the product management database 3 further. When unit components have unit components further at this time, it repeats decomposing it into item components.

[0033] And while specifying the hierarchy level of the item components described by the inputted component table and unit components according to this decomposition processing, the hierarchy level of the item components (it is also included when there are unit components) which constitute those unit components is specified.

[0034] The hierarchy level of the components which become the beginning described by the component table for assembly Namely, "1", While defining the hierarchy level of the components described in the hierarchy level of the finished product described by the component table by the component table which will be directly attached to "1" and its finished product as "2" When disassembling unit components into item components (it is also included when there are unit components) When the definition approach of determining the hierarchy level of the disassembled components in the form lowered one from the hierarchy level of the unit components of a decomposing agency is used, according to this definition approach, the hierarchy level of the item components called for by decomposition processing and unit components is specified.

[0035] Furthermore, at this step 3, processing which acquires the attribute information on the item components called for by decomposition processing and unit components by referring to production and the product management database 3 is also performed.

[0036] Then, at step 4, the component table which added attribute information, the information on being unit components, and hierarchy level is passed to the equipment PPL information generator 11, and processing is ended.

[0037] Thus, a preprocessor 10 inputs the component table of the product which serves as a processing object from the component table database 2, and it processes it so that attribute information, the information on being unit components, and hierarchy level may be added to it.

[0038] In addition, when the component table consists of layered structures as the component table which describes the configuration of the unit components described by the component table is prepared independently, it becomes possible to specify the hierarchy level of a component by referring to the component table of this layered structure, without a preprocessor 10 searching production and the product management database 3.

[0039] In response to processing of this preprocessor 10, as shown in drawing 4 thru/or the processing flow of drawing 7 R> 7, first, the equipment PPL information generator 11 is step 1, and receives that pretreated component table.

[0040] Then, assigning an empty process to each part article location, (like an empty erector) from the list location / hierarchy level / components classification of the components described by the pretreated component table, a process product tree is created and it expresses to a display screen as step 2. That is, a system screen with screen structure as shown, for example in drawing 8 is displayed, and the process product tree created into the left-hand side part is displayed.

[0041] here -- the inside of this process product tree, and "\*" -- item components -- "--" -- in unit components and "O", "1-6" express hierarchy level like the erector. Here, for convenience, the thing of explanation which a hierarchy level value becomes large is assumed, so that hierarchy level falls.

[0042] Then, it displays on a display screen, taking the components and correspondence which are described by the process product tree in the components name and the part number which are described by the pretreated component table at step 3, and the attribute information on the components matched with it. That is, the components name / part number / attribute information on the components described by the component table are displayed on a system screen, taking a process product tree and correspondence, as shown in drawing 8 .

[0043] Then, it waits for the user actuation to a system screen at step 4. That is, since a user inputs a value

into the input entry (fields other than a process product tree serve as an input entry) which a system screen has or directs the edit demand of a process product tree by operating the carbon button which a system screen has, he waits for those inputs.

[0044] If user actuation is detected at this step 4, when progress to step 5, judge whether it is having operated the "storing carbon button" which a user's shows in drawing 8 and judging that the user operated the "storing carbon button", it progresses to step 6, the equipment PPL information which created according to the processing to be explained from now on stores in an equipment PPL information database 5, and processing ends.

[0045] On the other hand, when judging that a user did not operate a "storing carbon button" at step 5 When progressing to step 7, judging whether it is that the user published the input request to an input entry and judging that the user published the input request After performing processing inputted into the input entry which has the value which progresses to step 8 and is specified as it specified, it returns to step 4 that the next user actuation should be processed.

[0046] That is, it processes changing the attribute information read from production and the product management database 3, or, and changing the process name like the erector who initialized into the attribute information read from production and the product management database 3 to the attribute item which was not registered to the components added by processing mentioned later etc. [ inputting a value ] [ inputting a components name and the part number ]

[0047] On the other hand, when judging that a user did not publish the input request to an input entry at step 7 Progress to step 9 (processing flow of drawing 5 ), and it judges whether it is having operated the "deletion carbon button" which a user's shows in drawing 8 , and "only a unit's having been a deletion carbon button." When judging that the user operated a "deletion carbon button" and "only a unit having been a deletion carbon button", after editing a process product tree by deleting the components which progress to step 10 and are specified as it, and a process, it returns to step 4 that the next user actuation should be processed.

[0048] namely, when the item components which \*\* process product tree has are chosen and a "deletion carbon button" is operated after it When the selected item component is deleted, the unit components which \*\* process product tree has are chosen and a "deletion carbon button" is operated after it When the selected unit entire component is deleted, the unit components which \*\* process product tree has are chosen and "only a unit is a deletion carbon button" is operated after it It leaves about the components which constitute the selected unit component (hierarchy level is raised one). \*\*\*\*, Only the selected unit component is deleted, and when the process which \*\* process product tree has is chosen and a "deletion carbon button" is operated after it, the selected process is deleted.

[0049] In addition, about selection of components or a process, it is also possible to choose by not choosing the distinguishing mark on a process product tree, and choosing the line matched with it.

[0050] The carbon button with which it progresses to step 11 and a user directs addition of components at step 9 on the other hand when judging that a user did not operate a "deletion carbon button" and "only a unit having been a deletion carbon button" () [ "\*" shown in drawing 8 , and ] [ " ] ", when judging whether it is having operated "\*" and "\*" and judging that the user operated this components addition carbon button After editing a process product tree by adding the components specified as the additional location (a ruled line top location and unit components) which progresses to step 12 and is specified as it (hierarchy level under one), it returns to step 4 that the next user actuation should be processed.

[0051] At this time, according to the components classification of additional components, in the "name-of-article column" of an input entry, it is processing so that general names, such as "item components" and "unit components", may be inputted automatically.

[0052] the carbon button with which "\*" directs addition of item components here -- " " -- the carbon button which directs addition of unit components, the carbon button with which "\*" directs addition of the self-supply components which are not indicated in a component table, and "\*" are carbon buttons which direct addition of the unit components used as a \*\*\*\*\* object.

[0053] On the other hand, when judging that a user did not operate a components addition carbon button at step 11 Progress to step 13 and it judges whether it is having operated the carbon button ("O", "-", "<>".

and "O" which are shown in drawing 8 ) with which a user's directs the addition of a process. When judging that the user operated this process addition carbon button, after editing a process product tree by adding the process specified as the additional location (ruled line top location) which progresses to step 14 and is specified as it, it returns to step 4 that the next user actuation should be processed.

[0054] At this time, according to the process classification like additional processing, in the "process name column" of an input entry, it is processing so that "assembly", "housekeeping", "a trial/inspection", and the general name "others" may be inputted automatically.

[0055] Here, the carbon button with which "O" directs the addition like an erector, the carbon button with which "--" directs the addition of a housekeeping process, the carbon button which directs the addition of "<>" trial / inspection process, and "O" are carbon buttons which direct the addition of other processes.

[0056] On the other hand, when judging that a user did not operate a process addition carbon button at step 13 When progressing to step 15, judging whether it is having operated the "migration carbon button" which a user's shows to drawing 8 and judging that the user operated the "migration carbon button" After editing a process product tree by moving the components specified and a process to the migration place location (a ruled line top location, unit components, and the migration place of a process being a ruled line top location for the migration place of components) which progresses to step 16 and is specified as it, it returns to step 4 that the next user actuation should be processed.

[0057] namely, when the item components which \*\* process product tree has are chosen, a migration place is specified after it and a "migration place carbon button" is operated Move the selected item component to the migration place, and the unit components which \*\* process product tree has are chosen. When a migration place is specified after it and a "migration place carbon button" is operated The components which the selected unit component and its unit component have are moved to the migration place. \*\* The process which a process product tree has is chosen, and when a migration place is specified after it and a "migration place carbon button" is operated, move the selected process to the migration place.

[0058] Here, it is processing so that it may move automatically in this migration according to it also about the name / number / attribute information on components or a process used as the candidate for migration.

[0059] On the other hand, when judging that a user did not operate a "migration carbon button" at step 15 Progress to step 17 and it judges whether it is having operated the carbon button (the "set expression carbon button", the "individual attached table present carbon button", and the "unit change carbon button" which are shown in drawing 8 ) with which a user's directs modification of the transcription of components. When judging that the user operated this transcription modification carbon button After editing a process product tree by performing modification processing of the transcription specified as step 18 (processing flow of drawing 6 ) to the components progressed and specified, it returns to step 4 that the next user actuation should be processed.

[0060] namely, when the components which a process product tree has are chosen and a "set expression carbon button" is operated after it While summarizing the line matched with the selected component, and the line with the same data which continues up and down as one line an input entry -- "-- more than -- the transcription of a process product tree is changed by registering into column" the line count summarized to one (the same components by which continuation arrangement is carried out are packed into one).

[0061] and when the components which a process product tree has are chosen and an "individual attached table present carbon button" is operated after it the line matched with the selected component -- an input entry -- "-- more than, while decomposing into the line for several minutes registered into column" an input entry -- "-- more than -- the transcription of a process product tree is changed by registering "1" into column", respectively (the components packed into one are disassembled separately).

[0062] And when the unit components which a process product tree has are chosen and a "unit change carbon button" is operated after it, while specifying the components and process which are included in the selected unit component and eliminating from on a screen, the transcription of a process product tree is changed by changing the foreground color of the selected unit component into a regular thing.

[0063] And when the unit components with which the foreground color was changed are chosen and a "unit change carbon button" is operated after it, while specifying the components and process which are included in

the selected unit component and carrying out regeneration on a screen, the transcription of a process product tree is changed by changing the foreground color of the selected unit component into the original thing.

[0064] On the other hand, when judging that a user did not operate a transcription modification carbon button at step 17 (processing flow of drawing 5 ) Progress to step 19 (processing flow of drawing 6 ), and it judges whether it is having operated the "image pasting carbon button" which a user's shows in drawing 8 , and the "automatic pasting carbon button." When judging that the user operated the "image pasting carbon button" and the "automatic pasting carbon button", after sticking the image specified as the components which progress to step 20 and are specified as it, or a process, it returns to step 4 that the next user actuation should be processed.

[0065] namely, when the components which a process product tree has are chosen and a "image pasting carbon button" is operated after it While sticking the image (for example, image of the selected components) which takes the configuration which displays a list of the image stored in the image file specified, and is chosen from them on the selected component By registering the number of the images stuck on the "PIC column" of an input entry, an image is stuck on the components which the user chose.

[0066] and when the process which a process product tree has is chosen and a "image pasting carbon button" is operated after it While sticking the image (for example, image in which the assembly procedure of the components in the selected process is shown) which takes the configuration which displays a list of the image stored in the image file specified, and is chosen from them on the selected process By registering the number of the images stuck on the "PIC column" of an input entry, an image is stuck on the process which the user chose.

[0067] and when the components which a process product tree has are chosen and a "automatic pasting carbon button" is operated after it While taking the configuration which specifies the image which the part number of the selected component points out by making the image stored in the image file specified applicable to pasting and sticking the specified image on the selected component By registering the number of the images stuck on the "PIC column" of an input entry, automatic pasting of the image is carried out at the components which the user chose.

[0068] and when the process which a process product tree has is chosen and a "automatic pasting carbon button" is operated after it The image stored in the image file specified is made applicable to pasting, and it is the operation number (when performing this processing) of that selected process. beforehand -- an operation number -- it is necessary to register, while taking the configuration which specifies the image to point out and sticking the specified image on the selected process By registering the number of the images stuck on the "PIC column" of an input entry, automatic pasting of the image is carried out at the process which the user chose.

[0069] In addition, as that as which all the components and processes were chosen, when a "automatic pasting carbon button" is operated without choosing components and a process, it is processing so that automatic pasting processing of this image may be performed.

[0070] Here, if an "elimination carbon button" is operated while displaying on a display screen using the "image display carbon button" explained below, this stuck image will be processed as that registration is eliminated.

[0071] On the other hand, when judging that a user did not operate a "image pasting carbon button" and a "automatic pasting carbon button" at step 19 When progressing to step 21, judging whether it is having operated the "image display carbon button" which a user's shows in drawing 8 and judging that the user operated the "image display carbon button" After displaying the image stuck on the components which progress to step 22 and are specified as it, or a process on a system screen, it returns to step 4 that the next user actuation should be processed.

[0072] namely, when the components and process which a process product tree has are chosen and an "image display carbon button" is operated after it While displaying the image stuck on the selected components and process, when two or more images are stuck, actuation of the "NEXT carbon button" is answered and the image stuck in an order from the image stuck on a head is displayed on a system screen.

[0073] On the other hand, when judging that a user did not operate an "image display carbon button" at step

21 When progressing to step 23, judging whether it is having operated the "warehouse ON carbon button" which a user's shows in drawing 8 and judging that the user operated the "warehouse ON carbon button" After setting the unit components which progress to step 24 and are specified as it as \*\*\*\*\* components, it returns to step 4 that the next user actuation should be processed.

[0074] namely, -- when the unit components which a process product tree has are chosen and a "warehouse ON carbon button" is operated after it, while specifying the components and process which are included in the selected unit component and eliminating from on a screen -- the distinguishing mark of the selected unit component -- "-- The unit components which the user chose from " by changing into " \*\*" are changed into \*\*\*\*\* components.

[0075] On the other hand, when judging that a user did not operate a "warehouse ON carbon button" at step 23 When progressing to step 25, judging whether it is having operated the "UNDO carbon button" which a user's shows in drawing 8 and judging that the user operated the "UNDO carbon button" After progressing to step 26 and returning to the condition before 1 edit processing, it returns to step 4 that the next user actuation should be processed.

[0076] That is, if the "UNDO carbon button" is operated while performing additional processing of components before the "UNDO carbon button" is operated, as it said that it returned to the condition before performing the additional processing, it will return to the condition before 1 edit processing.

[0077] Thus, the process product tree displayed on a system screen will be edited by the industrial engineer by repeating processing of step 4 – step 26, and it will complete in the form as this shows to drawing 9 .

[0078] One line is assigned to each part article and each process which are described by the process product tree, and he is trying to display the attribute information which each part article and each process have here using this one line, as shown in this drawing.

[0079] On the other hand, when judging that a user did not operate the "UNDO carbon button" at step 25 When progressing to step 27 (processing flow of drawing 7 ), judging whether it is having operated the "total carbon button" which a user's shows in drawing 8 and judging that the user operated the "total carbon button" After progressing to step 28, totaling the trial calculation man day inputted into the "trial calculation man day column" of an input entry and displaying the summary value on a last line, it returns to step 4 that the next user actuation should be processed.

[0080] That is, the total process time amount which completion of the product used as a processing object takes by totaling the trial calculation man day (for example, the second being described as a unit) inputted into the "trial calculation man day column" of an input entry is totaled, and it processes so that it may be displayed.

[0081] Although it is also good for an industrial engineer to input, the trial calculation man day inputted into this the "trial calculation man day column" is good by acquiring it and inputting automatically into the "trial calculation man day column", when production and the product management database 3 have taken the configuration which uses an operation number as a search key and manages a standard trial calculation man day. However, when performing this processing, it is necessary to register an operation number beforehand.

[0082] When judging that progressed to step 29, judged whether it was having operated the "comparison table carbon button" which a user's shows in drawing 8 , and the user, on the other hand, operated the "comparison table carbon button" at step 27 when judging that a user did not operate a "total carbon button", it progresses to step 30 and the process product tree and comparison level for a comparison are set up.

[0083] That is, when a "comparison table carbon button" is operated, the difference is extracted by comparing a process product tree on display on a system screen with the process product tree for a comparison, and since processing in which it is displayed on a system screen is performed, the process product tree and comparison level for a comparison are set up so that it may explain from now on.

[0084] Setting processing of the process product tree for [ this ] a comparison is performed by taking the configuration which displays a list of the process product tree which is stored for example, in the file for a comparison, and which was created until now, and making a process product tree choose from that inside.

[0085] Moreover, set up the comparison level that setting processing of this comparison level extracts the components with which for example, \*\* drawing number (matched with the part number) is different. \*\* The

same drawing number also sets up the comparison level of regarding it as the components which are different about the components with which parent drawing numbers differ, by a drawing number being different and being alike. \*\* Carry out by a parent drawing number differing from a drawing number, and the same drawing number and the same parent drawing number also displaying a selection screen with the alternative of setting up the comparison level of regarding it as the components which are different about the components with which hierarchy level differs, by being alike, and making it choose from them.

[0086] Then, after reading the equipment PPL information for a comparison from the equipment PPL information database 5, extracting the difference by comparing the read process product tree which equipment PPL information has with a process product tree on display on a system screen and expressing it as step 31 on a system screen, it returns to step 4 that the next user actuation should be processed.

[0087] That is, it is a form as shown, for example in drawing 10, and the difference between the two process product trees is displayed. When a user operates the "tree-search carbon button" which specifies the line number of a comparison table and a comparison table has at this time By matching cursor with the process product tree part used as the part of the difference Cursor is matched with the following process product tree part used as the part of the difference when a user operates the "retrieval [ degree ] carbon button" which a system screen has, while it is shown what part is different.

[0088] In addition, when the direction of the process product tree on display which becomes a comparing agency does not have the part which serves as a difference by few things, it is processing so that cursor may be matched with the location which a parent drawing number points out. Furthermore, when a user operates the "comparison table storing carbon button" which a comparison table has, it is processing so that it may store in the file which has the created comparison table specified.

[0089] By the comparison result shown in drawing 10, here at the 1st line of a comparison table with the product of a process product tree on display It is shown that there are few an item components (PWR PLATE, 11base). By the 2nd line of a comparison table with the product of a process product tree on display It is shown that there are many an item components (a radical headquarters article and buhin01). By the 3rd line of a comparison table with the product of a process product tree on display It is shown that there are few a unit components (MB, pa00700-258 k-prt), and the 4th line of a comparison table shows that there are few two self-supply components (KONEJI, ru6sw2n3-061-prt) with the product of a process product tree on display.

[0090] By this comparison function being prepared, when a design change etc. occurs, the difference in components or a process can be extracted easily.

[0091] On the other hand, when judging that a user did not operate a "comparison table carbon button" at step 29, it progresses to step 32, and after performing processing which user actuation specifies, it returns to step 4 that the next user actuation should be processed.

[0092] Thus, if the component table where attribute information, components classification, and hierarchy level were added is received from a preprocessor 10, the equipment PPL information generator 11 will display the process product tree which the component table specifies as an initial tree, will edit it in conversing with an industrial engineer, and will complete a process product tree in the form based on an industrial engineer's know-how.

[0093] Thus, the process product tree completed While describing it is necessary what kind of component to prepare although the product of a processing object is manufactured As it said, "They are attachment, after that, it, D item components, and E unit components about attachment, after that, it, and C unit components in B item components to A item components of the body of a product Attachment and ...." It has described in what kind of procedure those components should be assembled.

[0094] Furthermore, while the attribute information on components or a process which is needed for manufacture of the product of a processing object matches and is described by this process product tree, an image matches and is registered into it. Therefore, it can be said that the completed process product tree has described all the manufacturing information that is needed in manufacturing the product of a processing object.

[0095] After this, an industrial engineer can evaluate now on a desk the quality of conformance of the product designed in the early phase of a design after this according to the information (equipment PPL information)

displayed on this system screen.

[0096] An example of product manufacturing information offer equipment 20 which performs offer service of product manufacturing information is illustrated using the equipment PPL information generated by doing in this way by drawing 11.

[0097] This product manufacturing information offer equipment 20 performs offer service of product manufacturing information using the chitin grist creation program 21, the work procedure instruction sheet creation program 22, and the program of the design change notice program 23.

[0098] This chitin grist creation program 21 will extract only components information from that equipment PPL information by removing process information, if equipment PPL information is read from the equipment PPL information database 5.

[0099] And a part list as shown in drawing 12 is created by setting up the classification approach (for example, the classification approach of carrying out a group ping for every work site) of those components information, and classifying those components information according to conversing with an industrial engineer through a terminal 30 according to the classification approach (for example, according to work site) specified.

[0100] When it removes for an output about unit components, only unit components are made applicable to an output to a user at this time or all components are made applicable to an output, it is made to choose, and the components made applicable to an output according to that selection are determined, and a part list is displayed in the form which specifies whether they are the components made applicable to an output.

[0101] And following the format which carries out a newpage, when a classification changes, the list of images of each part article (visual chitin grist) made applicable to an output as shown in drawing 13 is created, and it can be printed by the printer 40 or it enables it to peruse by registering with a WEB server.

[0102] thus, in manufacturing a product, by the visual chitin grist (it having matched with the image of components and the nomenclature and the drawing number of the component also being described) created being prepared, the operator who manufactures a product prepares what kind of component -- it can kick -- it can grasp now correctly and easily whether it becomes.

[0103] On the other hand, the work procedure instruction sheet creation program 22 will display an input screen as shown in drawing 14 on the display screen of a terminal 30, if equipment PPL information is read from the equipment PPL information database 5. That is, an input screen with the process product tree which equipment PPL information has, and an input entry as shown in drawing 15 is displayed.

[0104] And document information which is described by the read process product tree which equipment PPL information has in conversing with an industrial engineer using this input screen and which it works in what kind of procedure, and what kind of thing has become the vital part of an activity for every process, and says that that reason is like this is created. It is made for the procedure of an activity to become intelligible by writing in an arrow head, an alphabetic character, etc. there at this time, as the image stuck on the process is displayed and it is shown in drawing 16.

[0105] And it can print by the printer 40 or enables it to peruse by registering with a WEB server by making into a work procedure instruction sheet document information as shown in drawing 17 which carried out in this way and was created.

[0106] Thus, in manufacturing a product, the operator who manufactures a product by the work procedure instruction sheet drawn up being prepared can grasp correctly and easily whether an activity must be done according to what kind of procedure, being cautious of what kind of thing.

[0107] On the other hand, the design change notice program 23 is accessing the design-change database 50 periodically, and confirms whether to be that there is a product by which the design change was carried out. And when judging that there is a product by which the design change was carried out, by accessing the equipment PPL information database 5, ID of the equipment PPL information on the product is acquired, and the industrial engineer of the charge registered by matching with equipment PPL information the information on the ID and the design-change information acquired from the design-change database 50 is notified by E-mail.

[0108] By this design change notice program 23 being prepared, an industrial engineer can cope with it suitable for a design change by the ability of the equipment PPL information on that product to be quickly accessed

now, when the design change of a product is performed.

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[Translation done.]

**\* NOTICES \***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is one example of this invention.

[Drawing 2] It is the explanatory view of a component table.

[Drawing 3] It is the processing flow which a preprocessor performs.

[Drawing 4] It is the processing flow which an equipment PPL information generator performs.

[Drawing 5] It is the processing flow which an equipment PPL information generator performs.

[Drawing 6] It is the processing flow which an equipment PPL information generator performs.

[Drawing 7] It is the processing flow which an equipment PPL information generator performs.

[Drawing 8] It is the explanatory view of a display screen.

[Drawing 9] It is the explanatory view of a display screen.

[Drawing 10] It is the explanatory view of a display screen.

[Drawing 11] It is the explanatory view of the system using this invention.

[Drawing 12] It is the explanatory view of a display screen.

[Drawing 13] It is the explanatory view of chitin grist.

[Drawing 14] It is the explanatory view of a display screen.

[Drawing 15] It is the explanatory view of a display screen.

[Drawing 16] It is the explanatory view of a display screen.

[Drawing 17] It is the explanatory view of a work procedure instruction sheet.

**[Description of Notations]**

1 Product Manufacturing Information Generation Equipment

2 Component Table Database

3 Production and Product Management Database

4 Image File System

5 Equipment PPL Information Database

10 Preprocessor

11 Equipment PPL Information Generator

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[Translation done.]

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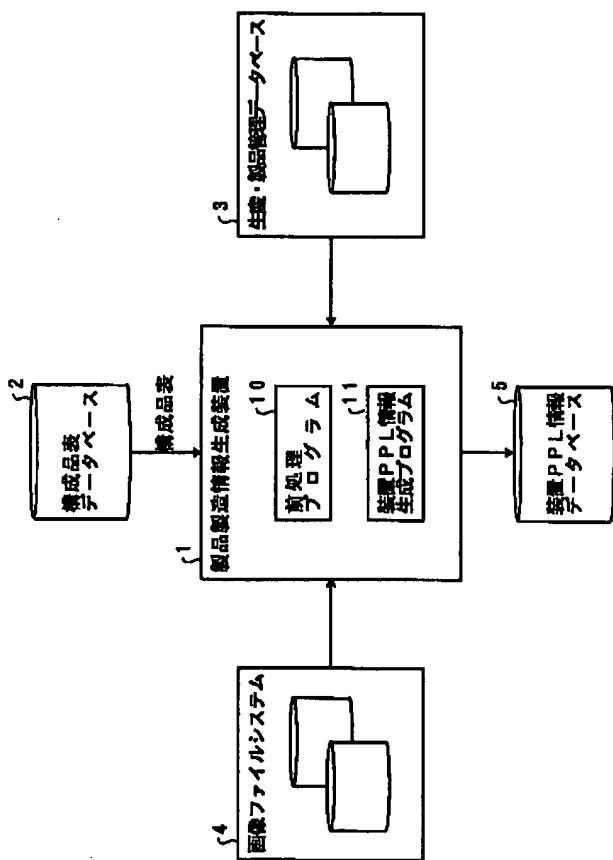
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DRAWINGS

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## [Drawing 1]

本発明の一実施例



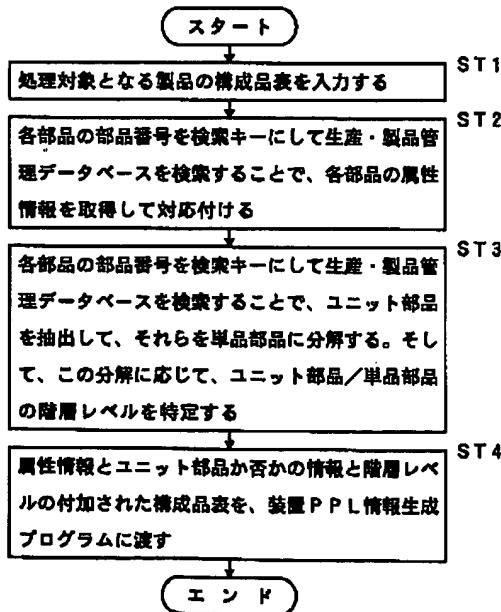
## [Drawing 2]

## 構成品表の説明図

名 称	HHHSTER-5	
図 番	B0PA03205-B10X	
部品名	部品番号	数 量
HHHSTER-5 ホシュ	PP03205-B101	
HHHSTER-5	PP03205-B102	
COVER SET	PP03205-C301	1
PT SCREW	PP82900-0162	3
MB-HAM5MP	PP20108-B51X	1
PT SCREW	PP82900-0162	1
DB-HAM5MP	PP20108-B52X	1
REAR PLATE	PP03205-Y155	1
コネクタ	PP6SW2N3-06121	2
コネクタ	PP6SBD3-08121	1
スペーサ	PP83852-0232	1
・	・	・
・	・	・
・	・	・
・	・	・
・	・	・
・	・	・
・	・	・
・	・	・
・	・	・

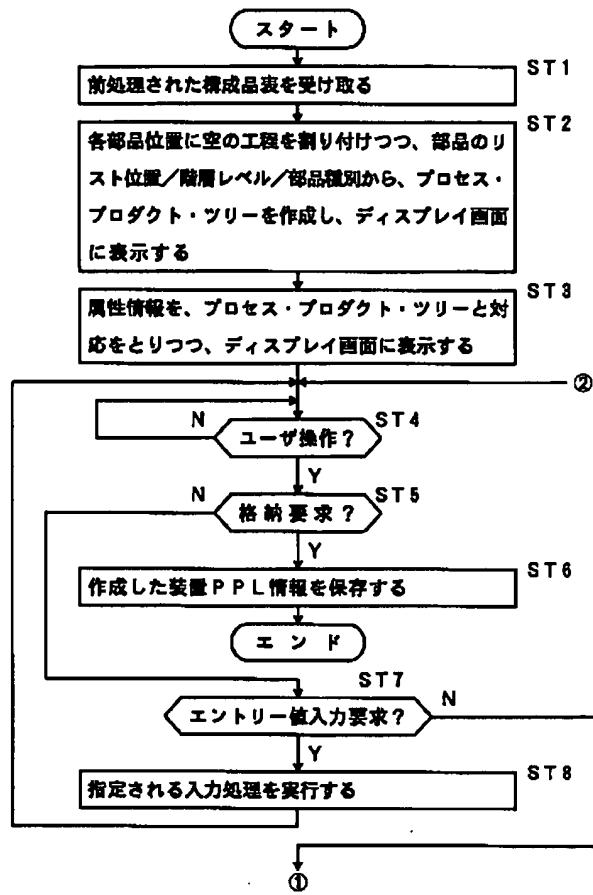
## [Drawing 3]

前処理プログラムの実行する処理フロー



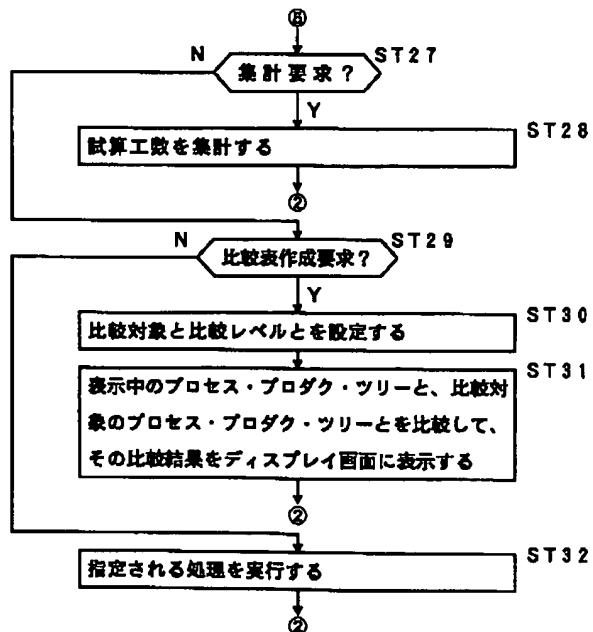
## [Drawing 4]

## 装置 PPL 情報生成プログラムの実行する処理フロー



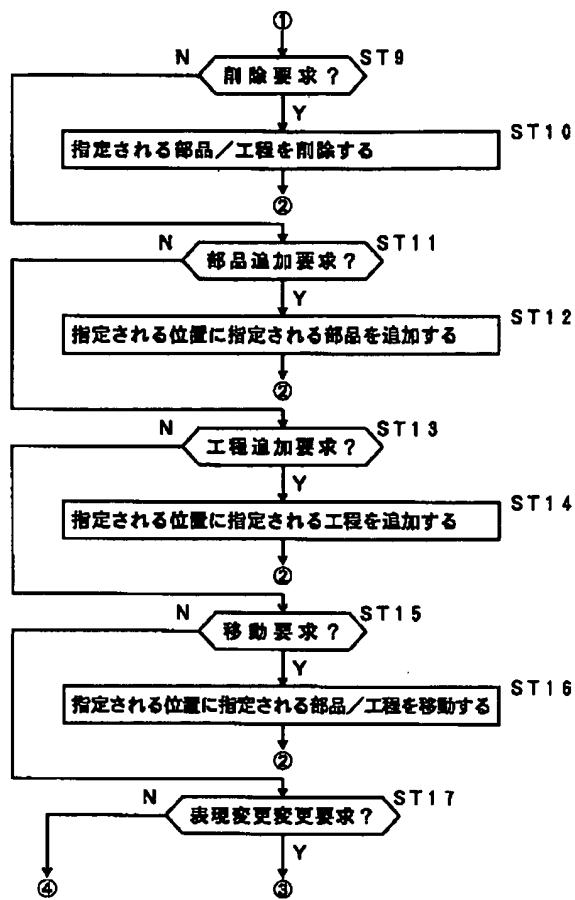
## [Drawing 7]

## 装置 PPL 情報生成プログラムの実行する処理フロー

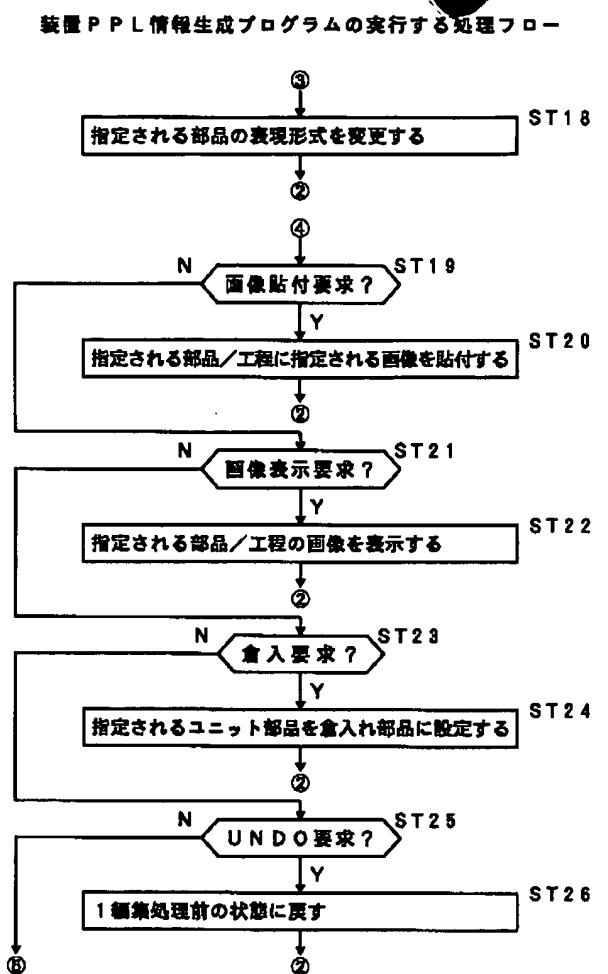


## [Drawing 5]

装置 PPL 情報生成プログラムの実行する処理フロー



## [Drawing 6]



[Drawing 8]

## ディスプレイ画面の説明図

設置 PPL 條件生成		名稱 : MMSTER-5K		圖番 : PP03205-0102	
地址	名稱	集合類型	個別表現	上-下切換	直接點付
UNDO	undo	上-下削除	▼ ▶ V	○ ◇ ◉	NEXT
1	4	5	6	部品/工程名	起點/終點名
X	XXXXXX		XXXX		XX
	組立 (S)				
X	XXXXXXXXXX		XXXXXXXXXX		XX
	組立 (S)				
X	XXXXXXXXXX		XXXXXXXXXX		XX
	組立 (S)				
X	XXXXXXXXXX		XXXXXXXXXX		XX
	組立 (S)				
X	XXXXXX		XXXXXX		XX
	組立 (S)				
X	XXXXXXXXXX		XXXXXXXXXX		XX
	組立 (S)				

### [Drawing 9]

## ディスプレイ画面の説明図

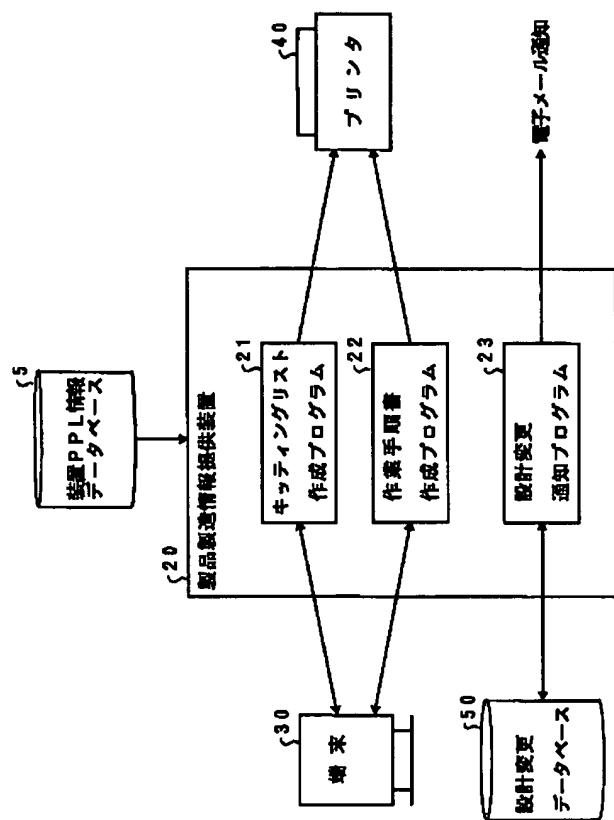
接線 P P L情報生成						名前 : HMASTER-FK	図番 : FPP3205-8102
ベース	差額	適合表示	絶対表示	直角表示	NEXT	選択	自動表示
UNDO	削除	二-1切替	二-1切替	二-1切替	NEXT	選択	自動表示
1	2	3	4	5	6	数	単品 / 工程番号
▼	▽	▽	▽	▽	▽	▽	▼
1	1	BASE COVER	FPP3205-1221	1	2	2	▲
		1	BASE COVERを置く		2	2	
		1	△△△	FPP3101-1059	1	2	200
		1	△△△		2	1	
		1	△△△		2	2	400
		1	DC CABLE	FPP7002-0035	1	1	
		1	DC CABLE	FPP3006-0000	1	1	
		1	DC CABLE		1	1	300
		1	DC CABLE		1	1	
		1	DC CABLE	FPP3010-2050	1	2	1
		1	DC CABLE	PP CABLE-1	1	2	
		1	DC CABLE	PP CABLE-1	1	2	
		1	DC CABLE	PP CABLE-1	1	2	1400
		1	DC CABLE	PP CABLE-1	1	2	
		2	FT SCREEN	FPP200-0102	1	2	
		▼	▼	▼	▼	▼	▲

[Drawing 10]

## ディスプレイ画面の説明図

### [Drawing 11]

## 本発明を利用するシステムの説明図



[Drawing 12]

## ディスプレイ画面の説明図

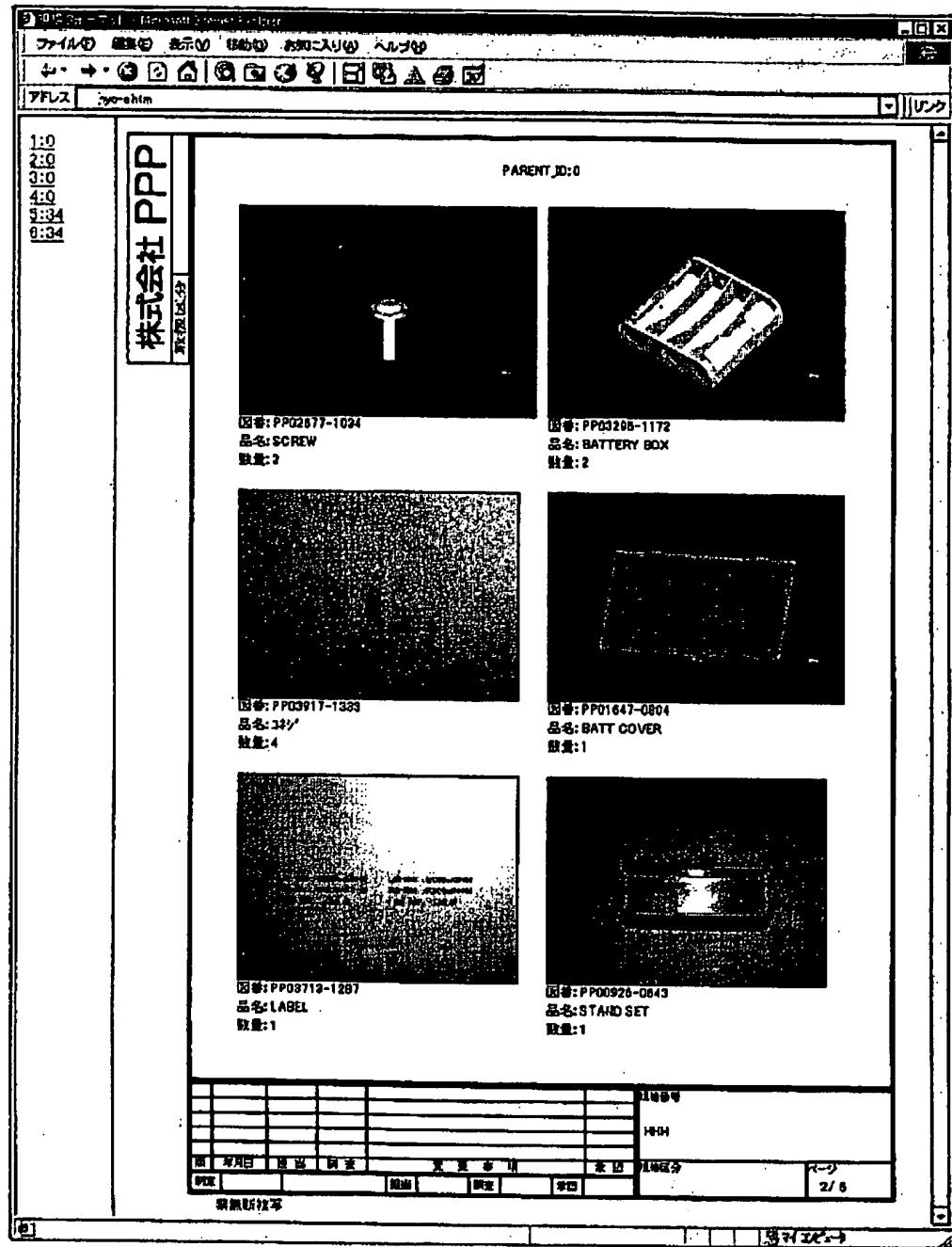
ヒューリカルキットシステム作成システム

ファイル(F) 編集(E) ヘルプ(H)

図番	品名	数量	イメージ
※ PP00102-0459	コトキーパー	1	PIC\PP00102-0459.JPG
※ PP00205-0482	カウト	1	PIC\PP00205-0482.JPG
○ PP00308-0605	CABLEユニット	1	
○ PP00411-0528	HHHユニット	1	PIC\PP00411-0528.JPG
※ PP00514-0551	リヤカイセシメイシ	1	
※ PP00617-0574	サービスモウイチヂンヒュウ	1	PIC\PP00617-0574.JPG
○ PP00720-0597	テシケン	1	PIC\PP00720-0597.JPG
○ PP00823-0620	HHH	1	PIC\PP00823-0620.JPG
※ PP00926-0643	STAND SET	1	PIC\PP00926-0643.JPG
○ PP01029-0666	TOP COVER ASSY	1	PIC\PP01029-0666.JPG
※ PP01132-0689	REAR PLATE	1	PIC\PP01132-0689.JPG
※ PP01235-0712	スペーサー(BT)	2	PIC\PP01235-0712.JPG
※ PP01441-0759	スペーサー(BC)	1	PIC\PP01441-0759.JPG
※ PP01544-0781	BASE COVER	1	PIC\PP01544-0781.JPG
※ PP01647-0804	BATT COVER	1	PIC\PP01647-0804.JPG
※ PP01750-0827	MB-HHH	1	PIC\PP01750-0827.JPG
※ PP01853-0850	DB-HHH	1	PIC\PP01853-0850.JPG
※ PP01956-0873	OP-HHH	1	PIC\PP01956-0873.JPG
※ PP02059-0898	CD-ROM	1	
※ PP02162-0919	モジュレーコード	1	PIC\PP02162-0919.JPG
※ PP02265-0942	LANケーブル	1	PIC\PP02265-0942.JPG
※ PP02368-0965	USB CABLE	1	PIC\PP02368-0965.JPG
○ PP02471-0988	DC CABLE	1	PIC\PP02471-0988.JPG
○ PP02574-1011	AC CORD	1	PIC\PP02574-1011.JPG
※ PP02677-1034	SCREW	6	PIC\PP02677-1034.JPG
※ PP03295-1172	BATTERY BOX	2	PIC\PP03295-1172.JPG
※ PP03407-1218	スペーサー	1	PIC\PP03407-1218.JPG
※ PP03609-1241	メハツ	1	PIC\PP03609-1241.JPG
※ PP03611-1264	ボショウシ	1	PIC\PP03611-1264.JPG

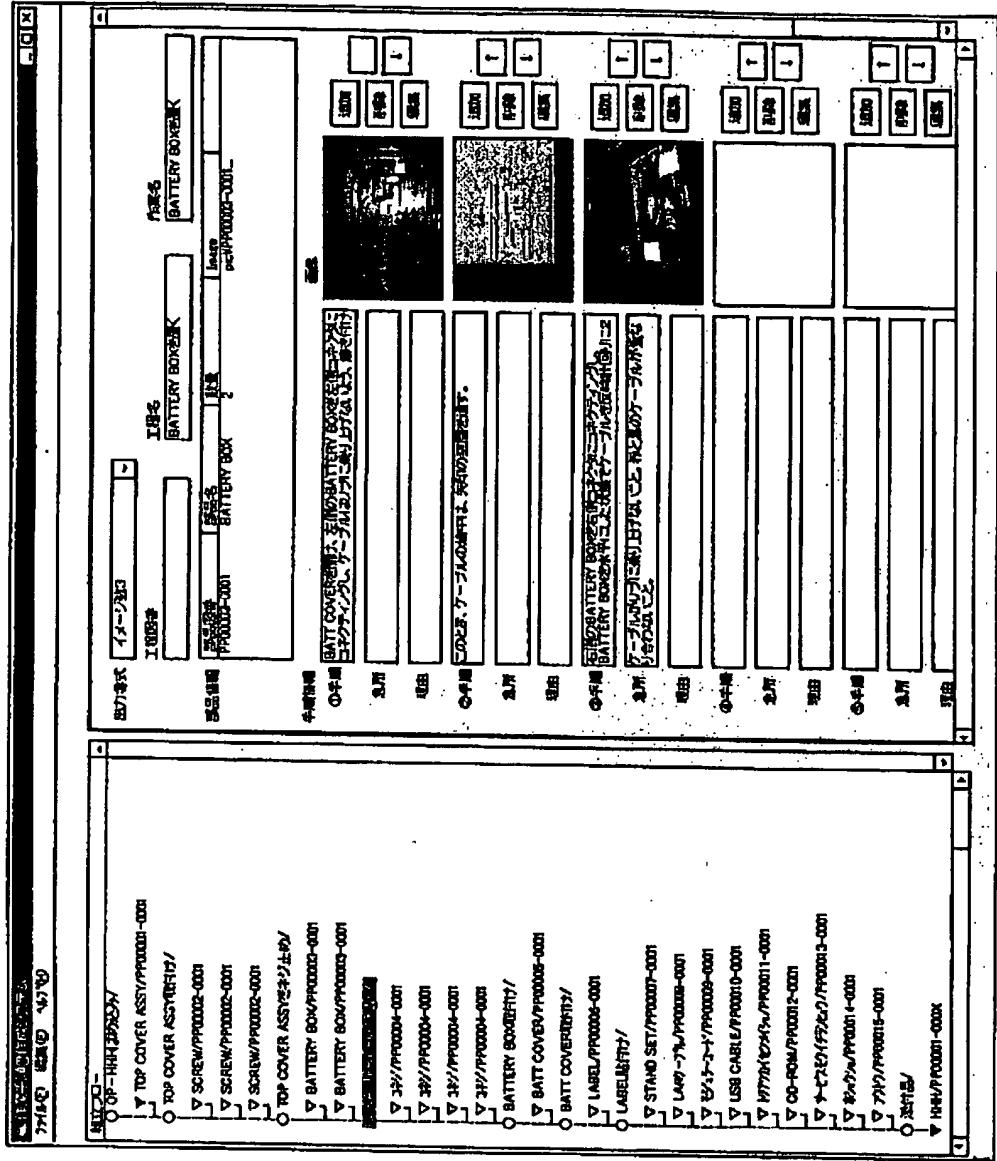
[Drawing 13]

## キッティングリストの説明図



### [Drawing 14]

## ディスプレイ画面の説明図



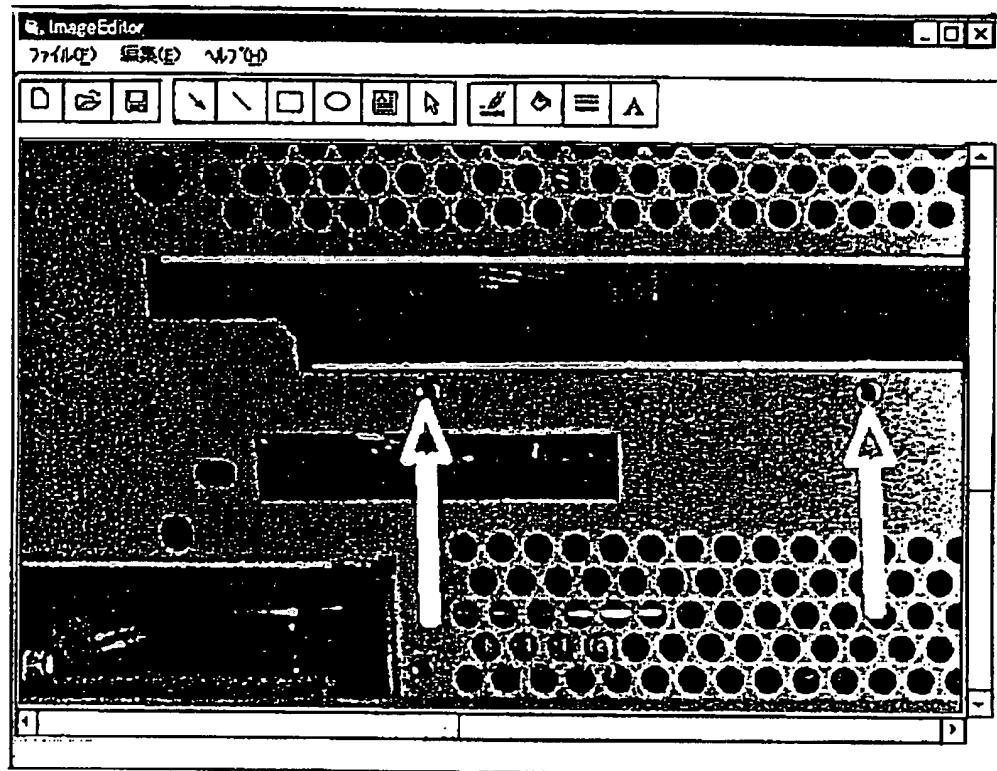
[Drawing 15]

## ディスプレイ画面の説明図

出力形式	▼			
工程図番	工程名	作業名		
部品情報	部品図番	部品名	数量	Image
手順情報				
①手順	急所	▼	追加	削除
急所	▼	▲	▼	▲
理由	▼	▼	▼	▼
②手順	急所	▼	追加	削除
急所	▼	▲	▼	▲
理由	▼	▼	▼	▼
③手順	急所	▼	追加	削除
急所	▼	▲	▼	▲
理由	▼	▼	▼	▼
④手順	急所	▼	追加	削除
急所	▼	▲	▼	▲
理由	▼	▼	▼	▼
⑤手順	急所	▼	追加	削除
急所	▼	▲	▼	▲
理由	▼	▼	▼	▼

[Drawing 16]

## ディスプレイ画面の説明図



[Drawing 17]

## 作業手順書の説明図

[Translation done.]